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life enhancing energy

January 23, 2001

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Mr. James D. Loock
Chief Engineer, Electric Division
Public Service Commission of Wisconsin
610 North Whitney Way
Post Office Box 7854
Madison, Wisconsin 53707-7854

Electric Division

Subject: PSC 113.0607 - Appropriate Inspection and Maintenance System Reliability

Dear Mr. Loock:

To satisfy the requirements of the service rule referenced above, enclosed is MGE's Plan for all electric generation assets owned, operated, and maintained by the company. MGE is a joint owner of the Columbia Energy Center and Kewaunee Nuclear Power Plant and will rely on the operators of these facilities to submit a Plan to meet the requirements of this service rule. MGE's electrical generation assets which are owned, operated, and maintained by the company are made up of nine (9) boilers, six (6) steam turbine/generators, five (5) combustion turbine/generators, and fifty-five (55) diesel engine/generators. A sixth combustion turbine/generator, West Marinette Combustion Turbine, is owned and operated by MGE but is maintained under a maintenance contract by Wisconsin Public Service Corporation. Specific electric generation asset data is identified in the enclosed Electrical Generation Asset List - Exhibit A.

I would like to point out that all MGE electrical generation equipment, except for the West Marinette Combustion Turbine, is nameplate rated below 50 MW. Based upon discussions during the August 9, 2000, meeting, the PSC 113.0607 Preventative Maintenance Plan being submitted for units less than 50 MW will not include generator performance reports.

I believe the Plan being submitted satisfies the requirements of PSC 113.0607, but if you have any questions or require additional information, please contact me at your earliest convenience.

Sincerely,

Steven C. Dietrich, P.E.

Director - Blount Maintenance and Stores

jms/Enclosure

UNIVERSITY MICROFILMS
SERIALS ACQUISITION
300 N ZEEB RD
ANN ARBOR MI 48106
24 JUL 29 P 4 33

MADISON GAS AND ELECTRIC COMPANY

ELECTRIC GENERATION FACILITIES

January 16, 2001

Preventative Maintenance Plan

In Accordance With

PSC 113.0607

UNIVERSITY MICROFILMS
SERIALS ACQUISITION
300 N ZEEB RD
ANN ARBOR MI 48106
24 JUL 29 P 4 33

TABLE OF CONTENTS

I.	PREVENTATIVE MAINTENANCE PLAN	3
A.	INTRODUCTION	3
B.	SCOPE OF PLAN	3
C.	INSPECTIONS	4
1.	Boilers	4
2.	Boiler Feedwater Pumps and Drives	5
3.	Forced Draft Fans and Drives	6
4.	Induced Draft Fans and Drives	7
5.	Primary Air Fans and Drives	8
6.	Pulverizers and Drives	9
7.	Electrostatic Precipitators	10
8.	Ash Systems	11
9.	Continuous Emission Monitors	12
10.	Steam Turbines/Generators	12
11.	Condensers	14
12.	Condensate Pumps and Drives	15
13.	Circulating Water Pumps and Drives	15
14.	Switchgear	16
15.	Controls	17
16.	Combustion Turbine/Generator Equipment	17
17.	Diesel Engine/Generator Equipment	19
II.	MAINTENANCE BUDGET PROCESS	21
III.	GENERATOR UNIT PERFORMANCE DATA	21
EXHIBIT A		
	ELECTRICAL GENERATION ASSET LIST	22

I. PREVENTATIVE MAINTENANCE PLAN

A. INTRODUCTION

The Preventative Maintenance Plan is being submitted to satisfy the requirements of PSC 113.0607. The Plan outlines the inspection interval, inspection methods, items checked, condition rating criteria, and corrective action.

The inspection intervals fall into several different categories, **Routine, Major, and Condition Based**. Routine inspections are generally performed by Operators who conduct periodic inspections (i.e., rounds) while the equipment is operating and take note of pressures, temperatures, operating levels, unusual noises, etc., and record this information. Major inspections, performed by maintenance staff, generally occur on a timed basis and are scheduled based upon historical maintenance requirements or OEM recommendations. Conditioned-based inspections occur whenever unusual operating or performance symptoms are detected (i.e., unusual vibrations, lower than expected capacities, etc.).

Inspection Method describes the type of inspection that is performed.

Items Checked describes in detail the specific operating items or equipment components inspected.

Condition Rating criteria describes what standards are utilized in determining if an inspection item is out of tolerance or performing unacceptably.

Corrective Action describes the type of action required to correct the inspection item.

B. SCOPE OF PLAN

The Preventative Maintenance Plan is developed for the following types of generation assets: **Steam Production, Turbine, and Generator Equipment; Combustion Turbine/Generator Equipment; and Diesel Engine/Generator Equipment**. The Plan is primarily focused on the major pieces of equipment utilized in the production of electricity. The major pieces of equipment are identified as follows:

Steam Production, Turbine, and Generator Equipment

- Boilers
- Boiler Feedwater Pumps and Drives
- Forced Draft Fans and Drives
- Induced Draft Fans and Drives
- Primary Air Fans and Drives
- Pulverizers and Drives
- Electrostatic Precipitators
- Ash System

Continuous Emission Monitors
Steam Turbines/Generators
Condensers
Condensate Pumps and Drives
Circulating Water Pumps and Drives
Switchgear
Controls

Combustion Turbine/Generator Equipment

Diesel Engine/Generator Equipment

C. INSPECTIONS

Steam Production, Turbine, and Generator Equipment

1. Boilers

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Pressures
Temperatures
Operating Levels
Boiler Water Purity
Steam Purity

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Approximately 18 Months)

Inspection Method: Visual Inspection
Hydrostatic Test
Nondestructive Element Testing

Items Checked: Steam Drum
Mud Drum
Waterwall Tubes and Headers
Superheater Tubes and Headers
Screen Tubes
Economizer
Hangers
Insulation and Refractory
Buckstays

Ducts
Expansion Joints
Sootblowers
Burners
Dampers
Air Heater

Condition Rating: OEM Specifications
Insurance Carrier (Hartford Steam Boiler) Recommendations
Tube NDE Limits:

<65% of Minimum Wall Thickness (MWT) for Replacements
<75% >65% of MWT for Pad Welds
<85% >75% of MWT for Shielding

Wisconsin Administrative Code, Department of Commerce, Chapter
Comm 41 ASME B31.1

Corrective Action: Adjust, Repair, or Replace as Required

2. Boiler Feedwater Pumps and Drives

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Pressures
Temperatures
Operating Levels
Oil Contaminants
Vibration Readings
Motor Amp Readings

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Condition Based)

Inspection Method: Disassemble and Visually Inspect (Pump, Fluid Coupling, and Motor)
Dimensionally Check Tolerances
Insulation Resistance Testing (Motor)

Items Checked: Pump:
Impellers
Diffusers
Casing Bushings

Casing Rings
Shaft
Sleeves
Seals
Bearings
Barrel
Coupling

Fluid Coupling:
Torque Converter
Shafts
Seals
Bushings
Sleeves
Couplings

Motor:
Windings
Shaft
Bearings
Seals
Coupling

Condition Rating: Tolerances Within OEM Specifications

Corrective Action: Adjust, Repair, or Replace as Required

3. Forced Draft Fans and Drives

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Pressures
Temperatures
Operating Levels
Oil Contaminants
Vibration Readings
Motor Amp Readings

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Condition Based)

Inspection Method: Disassemble and Visually Inspect (Fan, Fluid Coupling, and Motor)
Dimensionally Check Tolerances
Insulation Resistance Testing (Motor)

Items Checked: Fans:
Blades
Shrouds
Hub
Shaft
Sleeves
Seals
Bearings
Coupling

Fluid Coupling:
Torque Converter
Shafts
Seals
Bushings
Sleeves
Couplings

Motor:
Windings
Shaft
Bearings
Seals
Coupling

Condition Rating: Tolerances Within OEM Specifications

Corrective Action: Adjust, Repair, or Replace as Required

4. Induced Draft Fans and Drives

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Pressures
Temperatures
Operating Levels
Oil Contaminants
Vibration Readings
Motor Amp Readings

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Condition Based)

Inspection Method: Disassemble and Visually Inspect (Fan, Fluid Coupling, and Motor)
Dimensionally Check Tolerances
Insulation Resistance Testing (Motor)

Items Checked: Fans:
Blades
Shrouds
Hub
Shaft
Sleeves
Seals
Bearings
Coupling

Fluid Coupling:
Torque Converter
Shafts
Seals
Bushings
Sleeves
Couplings

Motor:
Windings
Shaft
Bearings
Seals
Coupling

Condition Rating: Tolerances Within OEM Specifications

Corrective Action: Repair or Replace as Required

5. Primary Air Fans and Drives

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Pressures
Temperatures

Operating Levels
Oil Contaminants
Vibration Readings
Motor Amp Readings

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Condition Based)

Inspection Method: Disassemble and Visually Inspect (Fan and Motor)
Dimensionally Check Tolerances
Insulation Resistance Testing (Motor)

Items Checked: Fans:
Blades
Shrouds
Hub
Shaft
Sleeves
Seals
Bearings
Coupling

Motor:
Windings
Shaft
Bearings
Seals
Coupling

Condition Rating: Tolerances Within OEM Specifications

Corrective Action: Adjust, Repair, or Replace as Required

6. Pulverizers and Drives

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Coal Fineness
Temperatures
Operating Levels

Oil Contaminants
Vibration Readings
Motor Amp Readings

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Condition Based)

Inspection Method: Disassemble and Visually Inspect (Pulverizer and Motor)
Dimensionally Check Tolerances
Nondestructive Element Testing
Insulation Resistance Testing (Motor)

Items Checked: Pulverizer:
Springs
Balls
Grinding Element
Hub
Wear Plates
Pinion
Gears
Shaft
Sleeves
Seals
Bearings
Bushings
Coupling

Motor:
Windings
Shaft
Bearings
Seals
Coupling

Condition Rating: Tolerances Within OEM Specifications

Corrective Action: Adjust, Repair, or Replace as Required

7. Electrostatic Precipitators

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Voltage Readings
Amp Readings
Spark Rate
Opacity Levels

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Approximately 18 Months)

Inspection Method: Visual Inspection

Items Checked: Wires
Plates
Chevrons
Controls and Rectifiers
Transformers
Rappers
Insulators
Ducts
Hoppers
Structural
Insulation
Lagging

Condition Rating: OEM Specifications

Corrective Action: Adjust, Repair, or Replace as Required

8. Ash Systems

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Vacuum Levels
Piping System Leaks
Filter Differential Pressure

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Approximately 18 Months)

Inspection Method: Visual Inspection

Items Checked: Vacuum Producing Equipment
Piping Systems
Isolation Valves
Collector
Bin Vent
Ash Hoppers
Filters
Controls

Condition Rating: OEM Specifications

Corrective Action: Adjust, Repair, or Replace as Required

9. Continuous Emission Monitors

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Calibrations

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Annually)

Inspection Method: Relative Accuracy Testing and Audit

Items Checked: Probes
Recorders
Sample Lines
Filters
Controls

Condition Rating: OEM Specifications

Corrective Action: Adjust, Repair, or Replace as Required

10. Steam Turbines/Generators

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Pressures
Temperatures

Oil Contaminants
Vibration Levels
Filter Differentials

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Approximately 5 to 10 Years)

Inspection Method: Disassemble and Visually Inspect (Turbine and Generator)
Dimensionally Check Tolerances
Nondestructive Element Testing
Overspeed Test
Insulation Resistance Tests (Generator Rotor and Stator)
Boresonics (As Required)

Items Checked: Turbine:
High-Pressure Cylinder
Low-Pressure Cylinder
Bolting
Glands
Baffles
Seals
High-Pressure Spindle
Low-Pressure Spindle
Blades
Nozzle Block
Blade Rings
Stationary Blades
Erosion Shields
Bearings
Governor
Valves
Linkages
Bushings
Cams
Gears
Inlet Valves
Overspeed Trip Device
Switches
RTDs
Gauges
Pumps
Regulators
Strainers
Crossover Pipes

Air Ejectors
Coolers
Filters

Generator/Exciter:

Rotor
Stator
Baffles
Hydrogen Seals
Fans
Bearings
Collector Rings
Brushes

Condition Rating: Tolerances Within OEM Specifications

Corrective Action: Adjust, Repair, or Replace as Required

11. Condensers

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Air In-Leakage
Condensate Purity
Vacuum Level

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Approximately 5 to 10 Years)

Inspection Method: Visual Inspection

Items Checked: Tubes
Tube Sheets
Baffles
Shell
Joint

Condition Rating: OEM Specifications

Corrective Action: Clean, Repair, or Plug as Required

12. Condensate Pumps and Drives

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Motor Amp Readings
Oil Contaminants
Vibration Readings

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Condition Based)

Inspection Method: Disassemble and Visually Inspect (Pump and Motor)
Dimensionally Check Tolerances
Insulation Resistance Test (Motor)

Items Checked: Pump:
Impellers
Diffusers
Casing Bushings
Casing Rings
Shaft
Sleeves
Seals
Bearings
Coupling

Motor:
Windings
Shaft
Bearings
Seals
Coupling

Condition Rating: Tolerances Within OEM Specifications

Corrective Action: Adjust, Repair, or Replace as Required

13. Circulating Water Pumps and Drives

Interval: Routine Inspection (Hourly, Daily, Weekly, and Monthly)

Inspection Method: Visual Inspection

Items Checked: Motor Amp Readings
Oil Contaminants
Vibration Readings

Condition Rating: OEM Acceptable Limits

Interval: Major Inspection (Condition Based)

Inspection Method: Disassemble and Visually Inspect (Pump and Motor)
Dimensionally Check Tolerances
Insulation Resistance Test (Motor)

Items Checked: Pump:
Impellers
Diffusers
Casing Bushings
Casing Rings
Shaft
Sleeves
Seals
Bearings
Coupling

Motor:
Windings
Shaft
Bearings
Seals
Coupling

Condition Rating: Tolerances Within OEM Specifications

Corrective Action: Adjust, Repair, or Replace as Required

14. Switchgear

Interval: Major Inspection (Approximately 18 months)

Inspection Method: Visual Inspection

Items Checked: Coils
Contacts
Relays
Linkages
Racking Mechanisms

Condition Rating: OEM Specifications

Corrective Action: Clean or Repair as Required

15. Controls

Interval: Major Inspection (Approximately 18 months)

Inspection Method: Visual Inspection

Items Checked: Digital/Analog:
Circuit Boards
Power Transformers
Transmitters
Transducers
RTDs
Switches

Pneumatic:
Regulators
Solenoids
Transmitters
Transducers
Actuators

Condition Rating: OEM Specifications

Corrective Action: Clean, Calibrate, Repair, or Replace as Required

16. Combustion Turbine/Generator Equipment

Interval: Routine Inspection (Weekly and Monthly)

Inspection Method: Visual Inspection

Items Checked: Pressures
Temperatures
Oil Contaminants
Vibration Levels
Filter Differentials

Condition Rating: OEM Acceptable Limits

Interval:**GE Frame 5:**

Combustion Inspection (>3,000 Fired Hours)
Hot Gas Inspection (>12,000 Fired Hours)
Major Inspection (>30,000 Fired Hours)

GE Frame 7:

Combustion Inspection (>8,000 to 12,000 Fired Hours)
Hot Gas Inspection (>12,000 to 16,000 Fired Hours)
Major Inspection (>24,000 to 32,000 Fired Hours)

Pratt - Whitney:

Combustion Inspection (>600 Fired Hours)
Hot Gas Inspection (Condition Based)
Major Inspection (Condition Based)

Inspection Method: Disassemble and Visually Inspect (Turbine and Generator)
Dimensionally Check Tolerances
Nondestructive Element Testing
Insulation Resistance Tests (Generator Rotor and Stator)

Items Checked:**Combustion Inspection:**

Fuel Nozzle Assemblies
Spark Plug Assemblies
Flame Detectors
Combustion Cap and Liner Assemblies
Combustion Cans and Crossover Tubes
Transition Pieces
Controls

Hot Gas Inspection:

Combustion Inspection Items, Plus
First-Stage Nozzle Assembly
Second-Stage Nozzle Assembly
First-Stage Turbine Wheel and Bucket Assembly
Second-Stage Turbine Wheel and Bucket Assembly
First- and Second-Stage Shrouds
Transition Piece Seals and Mounting Brackets
Accessory Gear Flex Coupling
Load Gear Flex Coupling
Bearings
Filters

Major Inspection:

Hot Gas Inspection Items, Plus
Compressor Stator Vanes

Inlet and Exit Guide Vanes
Entire Rotor Including Compressor Blades and Distance Piece
Turbine Wheel and Bucket Assemblies
Active and Inactive Thrust Bearing
Journal Bearings Including Housing and Seals
Interstage Turbine Labyrinth Seals
Exhaust Frame Including Turning Vanes
Exhaust Plenum and Silencing Sections
Inlet Plenum, Duct, Elbow, and Silencing Sections
Fire Suppression System

Generator/Exciter:

Rotor
Shaft
Stator
Fans
Bearings
Pedestals

Condition Rating: Tolerances Within OEM Specifications

Corrective Action: Adjust, Repair, or Replace as Required

17. Diesel Engine/Generator Equipment

Interval: Routine Inspection (Monthly)

Inspection Method: Visual Inspection

Items Checked: Oil Level
Coolant Level and Concentration
Leaks
Fuel Water Separator
Air Intake
Air Cleaner
Check Raw Water Strainer
Electronic Engine Controls

Condition Rating: OEM Specifications

Corrective Action: Clean, Adjust, or Repair as Required

Interval: Maintenance Inspection (>250 Operating Hours)

Inspection Method: Visual Inspection

Items Checked: Change Oils
Change Filters
Inspect and Clean Crankcase Breather
Inspect Drive Belts/Check Tension
Check SCA Concentration
Inspect Cooling Fan

Condition Rating: OEM Specifications

Corrective Action: Clean, Adjust, or Repair as Required

Interval: Maintenance Inspection (>2,000 Operating Hours)

Inspection Method: Visual Inspection

Items Checked: Adjust Crossheads and Valves
Check Fan Drive Idler Pivot Arm Assembly and Grease
Adjust Fan Belt
Check Engine Hoses
Check Engine Heater
Check Coolant Heater
Check Batteries
Check Engine Mounting Bolts
Measure Crankshaft End Clearance
Check Raw Water Heat Exchanger

Condition Rating: OEM Specifications

Corrective Action: Clean, Adjust, or Repair as Required

Interval: Maintenance Inspection (>6,000 Operating Hours)

Inspection Method: Visual Inspection

Items Checked: Replace Injectors
Replace Fuel Drain Manifold
Replace Fuel Supply Lines
Inspect Turbocharger
Inspect Vibration Damper
Inspect Water Pump
Inspect Coolant Thermostat, Seals, and Housing
Clean/Flush Cooling System
Check Belt Drive Fan Hub
Check Fan Drive Idler Pulley Assembly

Condition Rating: OEM Specifications

Corrective Action: Clean, Adjust, Repair, or Replace as Required

II. MAINTENANCE BUDGET PROCESS

The Company prepares an O&M budget on a two-year cycle to coincide with the rate case. The budgets are then adjusted annually to reflect any changes. Specific work activities which generally are repeated from year to year are evaluated and adjusted according to historic spending levels, results of preventative and predictive maintenance programs, and prior outage inspections. In addition, a rolling ten-year Fixed Capital budget is prepared. As it becomes uneconomical to repair equipment, the Fixed Capital budget is adjusted to reflect the replacement of equipment. In addition, the Fixed Capital budget is adjusted to account for the upgrade or replacement of equipment due to changes in regulations, future power requirements, and other Company initiatives.

III. GENERATOR UNIT PERFORMANCE DATA

The following information will be reported on generator nameplates rated >50 MW:

Summer Capacity (MW)
Winter Capacity (MW)
Net Dependable Capacity (MW)
Generation (MWh)
Heat Rate (BTU/KWh)
Capacity Factor
Fuel Consumed
Forced Outage Rate
Scheduled Outage Factor

EXHIBIT A
ELECTRICAL GENERATION ASSET LIST

Steam Production Equipment Data

Boiler No.	Manufacturer	Year Installed	Capacity	Steam Temperature	Steam Pressure
1 and 2	Babcock & Wilcox	1968	80,000 lbm/hr	510°F	220 psig
3	Babcock & Wilcox	1968	200,000 lbm/hr	825°F	825 psig
5	Babcock & Wilcox	1938	250,000 lbm/hr	825°F	825 psig
6	Foster Wheeler	1943	200,000 lbm/hr	825°F	825 psig
7	Babcock & Wilcox	1949	250,000 lbm/hr	825°F	825 psig
8	Babcock & Wilcox	1957	425,000 lbm/hr	950°F	1,250 psig
9	Babcock & Wilcox	1961	425,000 lbm/hr	950°F	1,250 psig
11	Babcock & Wilcox	1964	100,000 lbm/hr	825°F	825 psig

Steam Turbine/Generator Data

Turbine/Generator No.	Manufacturer	Year Installed	Turbine Capacity	Generator Capacity
1	Westinghouse	1926	10,000 KW	12,500 KVA
3	Allis-Chalmers	1953	30,000 KW	40,588 KVA
4	Allis-Chalmers	1938	25,000 KW	25,000 KVA
5	Westinghouse	1948	20,000 KW	28,750 KVA
6	Allis-Chalmers	1957	44,000 KW	58,824 KVA
7	Allis-Chalmers	1961	44,000 KW	58,824 KVA

WIND TURBINES ?

Combustion Turbine/Generator Data

Turbine/Generator	Manufacturer	Year Installed	Turbine Capacity	Generator Capacity
Fitchburg No. 1: Frame 5	General Electric	1973	24,250 KW	29,600 KVA
Fitchburg No. 2: Frame 5	General Electric	1973	24,250 KW	29,600 KVA
Sycamore No. 1: Frame 5	General Electric	1967	16,050 KW	21,176 KVA
Sycamore No. 2: Frame 5	General Electric	1972	20,150 KW	23,000 KVA
Nine Springs: FT4A	Pratt-Whitney	1964	14,000 KW	19,000 KVA
West Marinette: Frame 7	General Electric	2000	83,500 KW	105,900 KVA

Diesel Engine/Generators (Distributed Generation)

Manufacturer	Generator Size/Model	Quantity
Cummins	2000 DQKC	8
Cummins	1500 DFLE	8
Cummins	1500 DFMB	4
Cummins	1000 DFJD	8
Cummins	900 DFHC	2
Cummins	600 DFGB	22
Cummins	18VCW170	1
Generac	625	2

**Submitted by
Madison Gas and Electric Company
to the
Public Service Commission of Wisconsin**

**Preventative Maintenance Plan
for Electric Facilities**

January 26, 2001

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PUBLIC SERVICE COMMISSION

MGE - Preventative Maintenance Plan for Electric Facilities

Table of Contents

Overview	4
Transmission, Distribution, and Substation Facilities	5
Introduction	5
Methods and Tools	5
Condition Criteria	6
Budgeting	7
Transmission Inspection Summaries	8
Overhead Transmission Lines	8
Wood Transmission Poles	9
Underground Transmission	10
Special Transmission Issues	11
Distribution Inspection Summaries	12
Underground Distribution	12
Underground Distribution Network Vaults	13
Customer-Owned Vaults	14
Overhead Gang-Operated Air Break (GOAB) Switches	15
Overhead Capacitor Banks	15
Overhead Distribution Poles	16
Substation Inspection Summaries	17
Overview	17
Substation Maintenance Standards	18
Station Batteries, Racks, and Chargers	18
Power Transformers	19
Load Tap Changers	20
Power Circuit Breakers	20
Switches	21
Bus Work	22
Emergency Generators	22
Relays	23
Reclosers	23
Regulators	24
Capacitors	25
Grounding System	26
Communication Systems	26
Others Areas of Inspection and Maintenance	27
Tree Trimming	27
Cathodic Protection	27
Safety Equipment and Tools	27

MGE - Preventative Maintenance Plan for Electric Facilities

Appendixes	28
Appendix A - Overhead Transmission Facilities	
Appendix B - Underground Transmission Facilities	
Appendix C - Wood Transmission Poles	
Appendix D - Substation Transmission and Distribution	
Appendix E - Underground Distribution Equipment	
Appendix F - Distribution Network and Customer-Owned Vaults	
Appendix G - Overhead Switches	
Appendix H - Overhead Capacitor Banks	
Appendix I - Overhead Distribution Poles	
Appendix J - Electric Meter Shop Inspection Forms	
Appendix K - Safety-Related Documents	

MGE - Preventative Maintenance Plan for Electric Facilities

Overview

Madison Gas and Electric Company (MGE) has compiled a comprehensive maintenance plan that articulates the Company's practices for inspecting and maintaining electric operating facilities.

Preventative maintenance for transmission and distribution equipment, outside of substation facilities, is based on results of regularly scheduled inspections.

Much of this equipment is static, performing its function just by existing where it does on the system, like a pole or guy wire. For many of these facilities, remediation or replacement is prudent upon imminent or actual failure. Action taken as a result of inspections is sufficient to maintain reliability in these cases.

For active equipment on the system, it is important for the more complex and critical parts of the system to be operational when needed. Active equipment is inspected and maintained to ensure this equipment can carry out the needed function on the system, thus ensuring system reliability.

Inspections and preventative maintenance for substation facilities are completed according to the schedules and guidelines specified in the Substation Maintenance Standards. Substation facilities are generally considered to be active and require significant inspection and maintenance.

MGE's inspection and maintenance meet inspection standards included in the *National Electrical Safety Code*.

Report forms, checklists, and guidelines for electric facility inspections are included as appendices for reference.

MGE - Preventative Maintenance Plan for Electric Facilities

Transmission, Distribution, and Substation Facilities

Introduction

Transmission, distribution, and substation facilities can be viewed as static or active.

Static equipment includes items like supporting structures, cabinets, and many interconnecting parts that bring the system together. These items are generally designed to operate 20 years or more without any planned maintenance and have few, if any, moving parts. MGE's approach to maintaining static equipment consists of regular inspections to detect imminent or actual failures and repairing or replacing the components as necessary. The inspection cycle is chosen to eliminate the need to track equipment that might be deteriorating. If a piece of equipment cannot be counted on to safely reach the next inspection, it is replaced.

Active equipment is likely to have moving parts, sensors, oil, load break contacts, or other parts that could fail, possibly without immediate indication. MGE's approach to these items is frequent and routine inspections, along with scheduled testing and maintenance appropriate for the piece of equipment consistent with manufacturer's recommendations and industry practice.

Active equipment in this category may have a progressive maintenance condition that will deteriorate in a predictable way. An example of this is elevated levels of certain gases in oil-filled equipment. Such an elevated level may indicate a developing problem, but the situation may not require immediate action.

The Company will also perform regular maintenance on this equipment. This would include actions such as changing the contact, performing timing or other tests, filtering oil, etc.

In the event that a large or expensive piece of equipment is found to be in a state where major repair or replacement is immediately necessary, the Company will replace it with available equipment. After prompt removal of the affected equipment, a repair or replacement budget is prepared for the next budget year or existing budgets are adjusted. Smaller repairs are budgeted based on historical experience of maintenance requirements for this type of equipment.

Methods and Tools

The primary methods used in inspection of transmission and distribution facilities are visual, thermal, and infrared inspection. On the underground distribution system a TDR (Time Domain Reflectometer) is used to assess neutral condition. Inspections of substation facilities are also primarily done using visual, thermal, and infrared methods. Lab testing is done on oil and gas samples as a part of the maintenance routines.

Relays and other sensing equipment undergo a variety of tests according to manufacturers' recommendations. This testing requires relay test equipment and computer software. Increasingly, these tests are incorporated into the equipment itself and the monitoring is automated.

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Condition Criteria

Criteria used to rate the condition of facilities falls into four categories. The categories prioritize issues by immediate response required (Category 1), timely response required (Category 2), address during scheduled maintenance (Category 3), and acceptable operating condition (Category 4).

Repair and replacement policy provides for different levels of response appropriate for different conditions.

Category 1 - Immediate Response

In any case where public safety is at issue, MGE responds immediately to correct the problem. In these cases, the inspector is trained to call an Electric Operations supervisor for any condition the inspector cannot fix. Simple conditions such as a missing pentabolt or lock can be repaired by the inspector. Conditions that indicate an imminent failure likely to cause an outage or damage to equipment will trigger an immediate response also.

MGE takes its responsibility toward the environment very seriously. Consequently, problems of an environmental nature receive immediate response.

Category 2 - Timely Response

A timely response is generally considered to be one that occurs any time before the next inspection. This work is normally assigned to the Construction Department for fill-in work. For underground distribution equipment, a timely response may occur after the next inspection due to the very short inspection cycle used.

Category 3 – Monitoring Status

Category 3 items are maintenance items that, while not likely to create problems prior to the next inspection cycle, may be expected to continue to deteriorate with age. Subsequent inspections will be used to determine the appropriate time to correct these problems.

Substation and transmission facilities typically include more active equipment. As a result, minor issues will be corrected during the next scheduled maintenance. Issues involving larger and more complex equipment will be monitored, and an appropriate and economic solution will be planned.

Category 4 – Acceptable Operating Condition

Category 4 items are in acceptable operating condition at the time of inspection. No action is required until the next scheduled inspection.

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Budgeting

Budgeting for routine repairs and maintenance items throughout MGE's system is based on historical experience. Each year the operating departments review the past year's experience with respect to maintenance and repair activity. The next year's budget is adjusted to reflect historical trends and anticipate future needs.

In the event that a large or expensive piece of equipment is found to be in a state where major repair or replacement is necessary, the Company will replace it with available equipment. After prompt removal of the affected equipment, a repair or replacement budget is then prepared for the next budget year or budgets are adjusted accordingly.

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Transmission Inspection Summaries

Overhead Transmission Lines

Item	Interval	Description	Inspection	Correction
Aerial	Twice per year	<ul style="list-style-type: none">• Attached hardware• Paint condition• Right-of-way condition and signage• General condition of conductors, dampers, towers	<ul style="list-style-type: none">• Completed inspection forms• Summary spreadsheet• Kept in Electric Operations	<ul style="list-style-type: none">• Job orders• Time sheets
Walking	Annual	<ul style="list-style-type: none">• Tower condition and guys• Attached hardware• Conductor condition• Paint condition and signage• Right-of-way condition• Foundation condition	<ul style="list-style-type: none">• Spreadsheet in Electric Operations	<ul style="list-style-type: none">• Job orders• Time sheets

Overhead transmission lines are flown over and visually inspected twice a year. Inspected items include:

- Insulators
- Ground wire and ground wire moldings
- Guy shields
- Signage
- Tree growth
- Paint condition
- Supporting structures

Each structure is inspected according to the patrol checklist for each specific line. Issues are noted and transcribed into an electronic spreadsheet maintained by Electric Operations.

Issues found requiring immediate attention are resolved as soon as feasible. Issues not requiring immediate attention are handled as time permits according to their priority. Work done to resolve issues can be traced through the job order system and field crew time sheets.

Sonic testing on wood laminated crossarms in the system is done as needed. These crossarms are being phased out of the system.

Condition criteria

Category 1

- Unauthorized persons working on easement
- Floating (unattached) static wire
- Multiple broken insulators compromising safety
- Leaning or damaged structures

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Category 2

- Multiple broken insulators compromising reliability
- Damaged conductors
- Trees requiring nonroutine trimming to prevent imminent outages

Category 3

- Single broken insulators
- Right-of-way maintenance, changed conditions, and possible encroachment
- Trees requiring routine trimming
- Towers requiring painting
- Tower ground wires needing repair
- Dampers loose

Wood Transmission Poles

Item	Interval	Description	Inspection	Correction
Pole	10 years	<ul style="list-style-type: none">• Pole type and age• Deterioration and insect infestation• Decision to repair/replace, treat pole butt• All items identified by walking inspection	<ul style="list-style-type: none">• Hard copy report• Kept in Electric Operations	<ul style="list-style-type: none">• Job order• Time sheets

Wood poles undergo additional ground line inspection and treatment on a ten-year cycle. Inspections determine which poles are treated or replaced. While performing ground-line inspections, pole hardware and attachments are visually inspected. Inspection reports are provided by the contractor after performing the work and are filed in Electric Operations. The follow-up work can be found in job order documentation and crew time sheets.

Condition criteria

Category 1

- Loose hardware on poles
- Poles with dangerous amounts of pole rot or other structural damage
- Missing ground moldings or guy shields
- Missing or damaged warning signs

Category 2

- Poles that no longer meet codes for structural strength
- Damaged poles

Category 3

- Routine replacement or reinforcement of damaged or aged poles
- Repairing grounds and static connections

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Underground Transmission

Item	Interval	Description	Inspection	Correction
Facility Patrol	Weekly	<ul style="list-style-type: none">• Right-of-way condition and activity• Ground and site condition• Structures and related hardware	<ul style="list-style-type: none">• Kept in Corp. Records	<ul style="list-style-type: none">• Job orders• Time sheets
Anode testing	Semiannual	<ul style="list-style-type: none">• Anode condition	<ul style="list-style-type: none">• Annual summary• Kept in Corp. Records	<ul style="list-style-type: none">• Job orders• Time sheets
Cathodic protection	Biweekly	<ul style="list-style-type: none">• Visual	<ul style="list-style-type: none">• Kept in Corp. Records	<ul style="list-style-type: none">• Time sheets
Sheathing voltage limiters	Annual	<ul style="list-style-type: none">• Tested with high-voltage test	<ul style="list-style-type: none">• Kept in Corp. Records	<ul style="list-style-type: none">• Job orders• Time sheets

The underground transmission system is patrolled weekly. Items inspected include:

- Any construction or renovation
- Tree growth
- Ground condition
- Manhole covers
- Signage
- Riser structures
- Substation fence and appearance

Anodes are inspected twice each year and adjustments and repairs are made as needed. Line patrol reports are completed, routed internally, and stored in Corporate Records.

Condition criteria

Category 1

- Displaced manhole covers
- Unauthorized digging on the right-of-way
- Leaking oil
- Fencing missing or damaged
- Damaged or missing signage

Category 2

- Located routes indicated near trench routes for excavation
- Vandalism

Category 3

- Deteriorated manholes
- Rusted manway or manhole covers

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Special Transmission Issues

Item	Interval	Description	Inspection	Correction
Thermal Imaging (tester and camera)	As needed	<ul style="list-style-type: none">• Check for hot spots on equipment	<ul style="list-style-type: none">• Test results noted• Kept in Operations Support	<ul style="list-style-type: none">• Job orders• Time sheets
Corona Discharge (rented camera)	As needed	<ul style="list-style-type: none">• Rented equipment to inspect for corona discharge	<ul style="list-style-type: none">• Images stored on videotape• Kept in Operations Support	<ul style="list-style-type: none">• Job orders• Time sheets

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Distribution Inspection Summaries

Distribution facility inspections include:

- Underground distribution equipment
- Overhead distribution equipment
- Wood poles including signage and hardware
- Distribution network vault system including spot and grid facilities
- Company-owned equipment in customer-owned vaults

Underground Distribution

Item	Interval	Description	Inspection	Correction
Switchgear	3 years	<ul style="list-style-type: none">• Equip. configuration• Protection information• As-built details	<ul style="list-style-type: none">• Electronic transfer and storage by Operations Support	<ul style="list-style-type: none">• Hard copy in Electric Operations• Job orders• Time sheets
Transformers	3 years	<ul style="list-style-type: none">• Equip. configuration• Protection information• As-built details	<ul style="list-style-type: none">• Electronic transfer and storage by Operations Support	<ul style="list-style-type: none">• Hard copy in Electric Operations• Job orders• Time sheets
Elbow cabinets	3 years	<ul style="list-style-type: none">• Equip. configuration• As-built details	<ul style="list-style-type: none">• Electronic transfer and storage by Operations Support	<ul style="list-style-type: none">• Hard copy in Electric Operations• Job orders• Time sheets
Pedestals	3 years	<ul style="list-style-type: none">• Visual check of physical condition	<ul style="list-style-type: none">• Electronic transfer and storage by Operations Support	<ul style="list-style-type: none">• Hard copy in Electric Operations• Job orders• Time sheets

Underground distribution facilities are inspected every three years. Equipment inspected includes:

- Switchgear
- Transformers
- Elbow cabinets
- Pedestals

Equipment configuration, including switch and fuse information, is verified using hard copies of switch diagrams. Notes and as-built details are recorded and relayed to Drafting Services for correction.

Issues addressed during inspection include:

- Installation condition
- Signage
- Hardware condition

Follow-up work is tracked using hard copy reports, job orders, and crew time sheets. These records are kept in Electric Operations.

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Condition criteria

Category 1

- Open cabinets, lock and pentahead bolt does not meet double-lock requirement
- Cabinets with rust holes
- Damaged cabinets where live equipment is a hazard
- Swollen elbows
- Missing or damaged warning signs
- Cabinets displaced on pad
- Oil leaks

Category 2

- Overheated connections
- Animal damage
- Damaged protective posts

Category 3

- Cabinets requiring painting
- Pads requiring straightening

Underground Distribution Network Vaults

Item	Interval	Description	Inspection	Correction
Network vaults	Biweekly	<ul style="list-style-type: none">• Number of operations• Position of protective devices• Transformer information	<ul style="list-style-type: none">• Hard copy records• Electronic pilot program under way• Corp. Records	<ul style="list-style-type: none">• Job orders• Time sheets

Underground distribution network vaults are inspected every two weeks. Items inspected include:

- Number of operations
- Position of protective devices
- Transformer disconnect position
- Transformer oil level
- Transformer temperature
- General conditions

Condition criteria

Category 1

- Damaged network equipment
- Malfunctioning protectors
- Damaged vault covers and equipment
- Excessive water

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Category 2

- Cable damage including abrasion and leaks

Category 3

- Equipment requiring cleaning
- Equipment requiring painting
- Rust on vault covers

Customer-Owned Vaults

Item	Interval	Description	Inspection	Correction
Customer-owned vaults	3 years	<ul style="list-style-type: none">• Transformer condition• Cable/wire condition• Vault security	<ul style="list-style-type: none">• Inspection report files• Stored in Electric Operations• Electronic summary	<ul style="list-style-type: none">• Job orders• Time sheets

Company-owned equipment in customer-owned vaults is inspected about every three years. In addition to inspection, cleaning is also done. Inspection items include:

- Transformer condition
- Primary and secondary service wire condition
- Vault security including locks
- Lighting and signage

Issues found are recorded on the Customer-Owned Transformer/Enclosure Inspection form (see Appendix F). Follow-up work can be tracked in the job order system and the field crew time sheets.

Condition criteria

Category 1

- Damaged enclosure, vault entrance, or locks
- Unsecured facilities

Category 2

- Malfunctioning protectors
- Cable damage
- Signage

Category 3

- Equipment requiring cleaning
- Painting of equipment
- Enclosures requiring weed control

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Overhead Gang-Operated Air Break (GOAB) Switches

Item	Interval	Description	Inspection	Correction
Switches	10 years	<ul style="list-style-type: none">Equipment condition	<ul style="list-style-type: none">Hard copy in Electric Operations	<ul style="list-style-type: none">Job ordersTime sheets
	As needed	<ul style="list-style-type: none">Operating condition	<ul style="list-style-type: none">Time sheets	<ul style="list-style-type: none">Job ordersTime sheets

Switch inspection items include insulators, contacts, jumpers, and operating condition. Overhead switches are inspected every ten years or as needed. Follow-up work can be tracked in the job order system and field crew time sheets.

Condition criteria

Category 1

- Damaged control handles
- Broken insulators
- Missing locks

Category 2

- Bad connections
- Minor lightning damage
- Overheated switchblades

Category 3

- Switches that require lubrication
- Lock issues

Overhead Capacitor Banks

Item	Interval	Description	Inspection	Correction
Capacitor banks	Annual	<ul style="list-style-type: none">Switch conditionCapacitor conditionSwitch and control operationArrester/cutout condition	<ul style="list-style-type: none">Records in Electric Planning	<ul style="list-style-type: none">Job ordersTime sheets

Capacitor banks are inspected every year and maintenance items that need to be addressed are recorded. The inspection records are informal at this time, and issues found are dealt with as needed. A formal program will be implemented in 2001 for recording inspections and follow-up work.

Condition criteria

Category 1

- Swollen units
- Burnt cutouts
- Loose equipment

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Category 2

- Blown fuses
- Maintenance on controls
- Hot connections

Category 3

- Damaged animal guards

Overhead Distribution Poles

Item	Interval	Description	Inspection	Correction
Poles	10 years	<ul style="list-style-type: none">• Pole condition near the ground line• Visual inspection of attached hardware	<ul style="list-style-type: none">• Hard copy in Electric Operations	<ul style="list-style-type: none">• Job orders• Time sheets

Distribution poles undergo rigorous ground line inspection every 10 years. The primary goal of this inspection concerns pole condition near the ground line. A visual inspection is done concerning the attached hardware. Issues are noted in the inspection records and handled accordingly.

Follow-up notes are kept in Electric Operations. Follow-up work concerning rejected poles can be traced to job orders in the job order system and on field crew time sheets.

Condition criteria

Category 1

- Poles that are broken or unsupported
- Leaning poles that create a hazardous situation
- Broken insulators

Category 2

- Cracked insulators
- Broken crossarms
- Leaning poles
- Poles with ground rot or charring
- Poles with ground-line damage
- Damaged down guys
- Trees requiring nonroutine trimming

Category 3

- Routine maintenance required on aged equipment
- Trees requiring routine trimming
- Secondary and services requiring work or replacement

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Substation Inspection Summaries

Overview

Transmission and distribution substations are inspected according to guidelines defined in the Substation Maintenance Standards. Inspection and maintenance for substations is the most labor-intensive of the transmission, distribution, and substation facilities. Inspections are done biweekly, and more comprehensive inspections are done once every five years or more and include preventative maintenance activities. The exact schedule varies with each piece of equipment.

Results of routine inspections are captured in an exception report kept as an electronic spreadsheet. A hard copy logbook is kept at each substation where readings, comments, and inspectors' initials are recorded. Logbook entry samples are included in Appendix D.

Results of comprehensive inspections are stored electronically by field personnel on a portable computer and backed up on the computer network.

Follow-up work is assigned based on criticality of the issue, resulting in less critical work done as time permits. Some notes are kept on paper copies as needed.

Guidelines and schedules for routine and comprehensive inspections are included in MGE's Substation Maintenance Standards (see Appendix D for table of contents).

Included in Appendix K are reporting forms that Electric Meter Shop generally use as guidelines for completed inspections. These forms are for line reclosers, automatic transfer switchgear, voltage regulators, nitrogen at substations and presently, backup generators.

Condition criteria for substation facilities:

Category 1

- Any oil leaks where oil is actively leaking to the ground
- Power outages
- Equipment leaks
- Compressor problems
- Improper voltage regulation

Category 2

- Oil weeping on equipment (not on ground)
- Oil filtering due to low dielectric found on annual inspections
- Grounds in DC system

Category 3

- Annual oil samples
- Annual battery maintenance
- Oil leaks internal to equipment

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Substation Maintenance Standards

The Substation Maintenance Standards (SMS) are the protocol for inspection and maintenance work. This includes what is done during inspections conducted on cycles of weeks, maintenance and testing done on cycles of years, and any additional tests or procedures that may be needed.

The maintenance standards include sections on the following equipment:

- Station batteries, racks, and chargers
- Power transformers
- Load tap changers
- Power circuit breakers
- Switches
- Bus work
- Emergency generators
- Relays
- Reclosers
- Regulators
- Capacitors
- Grounding systems
- Communications systems

Other information in the standards includes hard copy forms used for inspection, testing and maintenance, and information on test equipment. Sections addressing environmental concerns and general safety are also included.

Station Batteries, Racks, and Chargers

Interval	Description	Inspection	Correction
Biweekly	<ul style="list-style-type: none">• Visual• Battery check	<ul style="list-style-type: none">• Exception report	<ul style="list-style-type: none">• Exception report• Time sheets
Annual	<ul style="list-style-type: none">• Visual• Battery measurements	<ul style="list-style-type: none">• Electronic documents	<ul style="list-style-type: none">• Job orders• Time sheets

Biweekly inspections include:

- Overall visual inspection of batteries and associated equipment to check for deterioration
- Electrolyte fluid level and leaks
- Battery charger voltage, currents, and grounds

Annual inspections include:

- Cell impedance checks
- Cell voltage checks
- Specific gravity checks
- Strap resistance between cells
- Clean up connection points (clean, grease, and torque)

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Power Transformers

Interval	Description	Inspection	Correction
Biweekly	<ul style="list-style-type: none">• Visual• Transformer systems check	<ul style="list-style-type: none">• Exception report	<ul style="list-style-type: none">• Exception report• Time sheets
Annual	<ul style="list-style-type: none">• Visual• Thermal imaging• Oil sample• Gas analysis and sample	<ul style="list-style-type: none">• Electronic documents• Lab reports	<ul style="list-style-type: none">• Job orders• Time sheets
As needed	<ul style="list-style-type: none">• Visual• Transformer tests• Process oil	<ul style="list-style-type: none">• Electronic documents	<ul style="list-style-type: none">• Job orders• Time sheets

Biweekly inspections include:

- Nitrogen gas pressure checks
- Gas and oil leaks
- Oil level and temperature check
- Winding temperature
- Cooling fan status
- Oil circulating pump status
- Porcelain condition
- Desiccant filter condition
- Compartment heaters

Annual inspections and maintenance include:

- Transformer oil levels (including bushings and conservator)
- Bushing condition
- Cooling system including fan and oil circulating pump, controls, lubing as necessary, and debris removal
- Perform infrared scan on radiators
- Check control wiring and junction boxes
- Check grounding including pad and surrounding grid
- Perform oil tests for dielectric, color, and acidity
- Combustible gas analysis using a portable unit, purging or pressurizing nitrogen gas as necessary
- Dissolved gas sample from transformer for outside lab analysis

Additional tests done as needed include:

- Transformer tests
- Internal visual inspection of transformer condition
- Impedance tests of coil and core
- Filter oil and heat process oil, new or existing
- Power factor test when transformer is new or tap position is changed
- Turns ratio test when transformer new or tap position is changed
- Dielectric absorption test to check insulation

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Load Tap Changers

Interval	Description	Inspection	Correction
Biweekly	<ul style="list-style-type: none">• Visual	<ul style="list-style-type: none">• Exception report	<ul style="list-style-type: none">• Exception report
Annual	<ul style="list-style-type: none">• Visual• Exercise equipment• Oil sample for test	<ul style="list-style-type: none">• Electronic documents• Lab reports	<ul style="list-style-type: none">• Job orders• Time sheets
As needed	<ul style="list-style-type: none">• Visual• Check contact• Filter oil• Turns ratio test	<ul style="list-style-type: none">• Electronic documents	<ul style="list-style-type: none">• Job orders• Time sheets

Biweekly inspections include:

- Check for oil level, oil and gas leaks
- Veeder count (number of operations)
- Tap position and range, resetting drag hands as applicable
- Control setting and mode
- Compartment heaters

Annual inspections include:

- Oil sample for dielectric, color, and acidity
- Operate tap changer control and verify control sequence and alarms
- Operate load tap changer over a range of positions and the off positions
- Compartment heaters

Additional tests done as needed include:

- Internal visual inspection of connections and parts
- Check condition of contacts and drag fingers, and replace as needed
- Filter oil
- Perform a turns ratio test when commissioning a transformer or as needed, operating through all the tap positions

Power Circuit Breakers

Interval	Description	Inspection	Correction
Biweekly	<ul style="list-style-type: none">• Visual	<ul style="list-style-type: none">• Expectation report	<ul style="list-style-type: none">• Expectation report• Time sheets
Annual	<ul style="list-style-type: none">• Pneumatic equipment check• Oil sample	<ul style="list-style-type: none">• Electronic documents• Lab reports	<ul style="list-style-type: none">• Job orders• Time sheets
5 Years	<ul style="list-style-type: none">• Visual• Exercise equipment• Check contacts and equipment• Oil sample	<ul style="list-style-type: none">• Electronic documents• Lab reports	<ul style="list-style-type: none">• Job orders• Time sheets

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Biweekly inspections include:

- Oil leaks
- Status of breaker, control, and recloser
- Verify trip air pressure and check for leaks
- Veeder counts
- Check over compressor, drain water, and check pressures
- Accumulator pressure and hydraulic pressure
- Confirm proper pressure in all SF6 equipment

Annual inspections and maintenance include:

- Oil sample for dielectric, color, and acidity
- Check and maintain pneumatic systems, and verify limits and proper operation

Inspections done every five years include:

- Check contacts; maintain and adjust for proper operation
- External visual inspection to check for:
 - Connections
 - Conditions
 - Oil level and seals
 - Ground connection
 - Breaker foundation
- Internal visual inspection to check for:
 - Loose connections
 - Corrosion
 - Broken seals
 - Worn linkage
- Contact replacement as needed
- Oil sample for dielectric, color, and acidity
- Filter oil
- Operate breaker trip mechanism and verify travel and operation
- Operate breaker control operation

Switches

Interval	Description	Inspection	Correction
Biweekly	<ul style="list-style-type: none">• Visual	<ul style="list-style-type: none">• Exception report	<ul style="list-style-type: none">• Exception report• Time sheets
Annual	<ul style="list-style-type: none">• Visual• Thermal imaging	<ul style="list-style-type: none">• Electronic documents	<ul style="list-style-type: none">• Job orders• Time sheets

Biweekly inspections include:

- Visual inspection of switch components to check for any damage

Annual inspections and maintenance include:

- Check the switches using thermal imaging

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Bus Work

Interval	Description	Inspection	Correction
Biweekly	<ul style="list-style-type: none">• Visual	<ul style="list-style-type: none">• Exception report	<ul style="list-style-type: none">• Exception report• Time sheets
Annual	<ul style="list-style-type: none">• Visual• Thermal imaging	<ul style="list-style-type: none">• Electronic documents	<ul style="list-style-type: none">• Job orders• Time sheets

Biweekly inspections include:

- Visual inspection to check for any damage

Annual inspection and maintenance includes the following:

- Scan bus work and structures with thermal imaging to check for overheating

Emergency Generators

Interval	Description	Inspection	Correction
Biweekly	<ul style="list-style-type: none">• Visual	<ul style="list-style-type: none">• Exception report	<ul style="list-style-type: none">• Exception report• Time sheets
Annual	<ul style="list-style-type: none">• Exercise equipment• Battery check• Oil, filters, and valves	<ul style="list-style-type: none">• Electronic documents	<ul style="list-style-type: none">• Job orders• Time sheets

Biweekly inspections include:

- Visual inspection of generators and batteries to check for leaks, corrosion, and structural damage
- Check fluid levels

Annual inspections and maintenance include:

- Operate the generators monthly
- Check moving parts and lube
- Change oil and filter
- Check and clean all other filters and valves
- Check:
 - Cell impedances
 - Cell voltages
 - Specific gravities
 - Cell-to-cell strap resistances
- Check and maintain connection points

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Relays

Interval	Description	Inspection	Correction
Biweekly	<ul style="list-style-type: none">Procedures and guidelines are included in the SMS.	<ul style="list-style-type: none">Exception report	<ul style="list-style-type: none">Exception reportTime sheets
5 Years	<ul style="list-style-type: none">Procedures and guidelines are included in the SMS.	<ul style="list-style-type: none">Electronic documents	<ul style="list-style-type: none">Job ordersTime sheets
As needed	<ul style="list-style-type: none">Check coaxial cable	<ul style="list-style-type: none">Electronic documents	<ul style="list-style-type: none">Time sheets

Procedures for specific relays are found in Section 1100 in the SMS. A summary of relays and test methods currently in use is included in Appendix D.

The following are general guidelines that apply to all relays.

Biweekly inspections include:

- Visual inspection to make sure covers are seated
- Check, record, and reset any targets

Five-year testing includes the following:

- Perform functional tests of electromechanical relays including backup and tap changing relays
- Test electronic relays using internal testing
- Check for loose wiring
- Verify and set line drop compensation
- Test all relays associated with transfer switches and generators where applicable

Additional testing includes the following:

- Check coaxial cable insulation condition
- Check shield-to-ground resistance

Reclosers

Interval	Description	Inspection	Correction
Biweekly	<ul style="list-style-type: none">Visual	<ul style="list-style-type: none">Exception report	<ul style="list-style-type: none">Exception reportTime sheets
5 Years	<ul style="list-style-type: none">VisualExercise equipmentOil sampleFilter oil	<ul style="list-style-type: none">Electronic documentsLab reports	<ul style="list-style-type: none">Job ordersTime sheets
As needed	<ul style="list-style-type: none">VisualCheck contactCheck pickup coil	<ul style="list-style-type: none">Electronic documents	<ul style="list-style-type: none">Job ordersTime sheets

Biweekly inspections include:

- Visual inspection to check recloser, bushings, and remove accumulated debris
- Check recloser status and mode
- Check for fluid leaks and oil level
- Check veeder counts

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Five-year inspection and maintenance includes the following:

- External visual inspection
- Operate recloser to check for:
 - Proper operation and control
 - Timing
 - Adjust settings as needed
- Oil sample dielectric, color, acidity testing
- Filter oil

Additional tests include:

- Internal visual inspection to check internals for wear and stress
- Check contact resistance
- Verify recloser pickup coil settings
- Wipe down and check porcelain for any damage

At present, hydraulic reclosers are not inspected on a multi-weekly cycle. Maintenance is done every five years.

Regulators

Interval	Description	Inspection	Correction
Biweekly	<ul style="list-style-type: none">• Visual	<ul style="list-style-type: none">• Exception report	<ul style="list-style-type: none">• Exception report• Time sheets
5 Years	<ul style="list-style-type: none">• Visual (external)• Oil sample• Filter oil	<ul style="list-style-type: none">• Electronic documents• Lab reports	<ul style="list-style-type: none">• Job orders• Time sheets
As needed	<ul style="list-style-type: none">• Visual (internal)• Check turns ratios	<ul style="list-style-type: none">• Electronic documents	<ul style="list-style-type: none">• Job orders• Time sheets

Biweekly inspections include:

- Visual inspection to check for damage or debris
- Check regulator status
- Check for fluid leaks

Five-year inspection and maintenance includes the following:

- External visual inspection to check for:
 - Connections and condition
 - Flange seal
 - Ground connections
 - Foundation
- Oil sample for dielectric, color, and acidity test
- Filter oil

MGE - Preventative Maintenance Plan for Electric Facilities

Additional tests include:

- Internal visual inspection of connections and condition, seals and loose debris in tank
- Turns ratio through all tap positions when transformer is commissioned and when tap position changes
- Porcelain check including wipe down

Capacitors

Interval	Description	Inspection	Correction
Biweekly	<ul style="list-style-type: none">• Visual	<ul style="list-style-type: none">• Exception report	<ul style="list-style-type: none">• Exception report• Time sheets
Annual	<ul style="list-style-type: none">• Visual (external)• Exercise equipment• Oil sample and measurement• Relay and alarm operation• Thermal imaging	<ul style="list-style-type: none">• Electronic documents• Lab reports	<ul style="list-style-type: none">• Job orders• Time sheets
As needed	<ul style="list-style-type: none">• Visual (internal)• Check contact	<ul style="list-style-type: none">• Electronic documents	<ul style="list-style-type: none">• Job orders• Time sheets

Biweekly inspections include:

- Visual inspection to check fusing, damage, and for debris
- Check for fluid leaks

Annual inspections and maintenance include:

- Neutral unbalance relay range and operation, and operation of alarm communication
- Thermal imaging to check for excessive heating
- External visual inspection to check for:
 - Connections and condition
 - Flange seal
 - Ground connections
 - Foundation

Additional tests include:

- Internal visual inspection of:
 - Connections and condition
 - Seals
 - Internal leakage
 - Contact condition and alignment
 - Check for debris
- Measure contact resistance and check condition for proper operation

MGE - Preventative Maintenance Plan for Electric Facilities

Grounding System

Interval	Description	Inspection	Correction
Biweekly	<ul style="list-style-type: none">• Visual	<ul style="list-style-type: none">• Exception report	<ul style="list-style-type: none">• Exception report• Time sheets
Annual	<ul style="list-style-type: none">• Ground resistance measurement• Ground rod check	<ul style="list-style-type: none">• Electronic documents	<ul style="list-style-type: none">• Job orders• Time sheets

Biweekly inspections include:

- Visual inspection of connections and conditions

Annual inspections and maintenance include:

- Measure and plot ground resistance for the grid when the substation is commissioned or when there is damage
- Inspect accessible ground rods and redrive rods where needed

Communication Systems

Interval	Description	Inspection	Correction
Annual	<ul style="list-style-type: none">• Relay operation and settings• Replace RTU standby batteries	<ul style="list-style-type: none">• Electronic documents	<ul style="list-style-type: none">• Job orders• Time sheets

Annual inspections and maintenance include:

- Verify relay operation for communication
- Verify and change relay settings when needed
- Replace and recycle standby batteries in RTU

MGE - Preventative Maintenance Plan for Electric Facilities

Others Areas of Inspection and Maintenance

Tree Trimming

PSC 113 requires that the transmission and distribution systems be inspected for the presence of power line natural hazards every three to eight years.

- Trees on the electric system are presently trimmed on a 5-1/2 year cycle.
- Potential tree-related problems are noted upon discovery during system patrols.
- Hazards to our facilities are cleared as soon as possible.
- Trees that present a future hazard are cleared as work permits, with oak pruning occurring between November through March.
- Emergency trimming is done as needed. Determination of need is based on observation by field personnel or reports by citizens.

Cathodic Protection

Inspection and maintenance of the cathodic protection system on high-pressure, oil-filled equipment and facilities is performed semiannually. There are multiple inspections involved on varying cycles. Results of the inspections and any recommendations are summarized in a semiannual report. These reports are kept in Corporate Records.

Oil-filled transmission lines - Testing of cathodic protection on oil-filled pipe for higher voltage lines is done twice a year.

Safety Equipment and Tools

Rubber goods used for safety include gloves and sleeves, hoses and blankets. These items are exchanged, cleaned, and tested on a two-month cycle. Doing so ensures these items will perform as expected and are in excellent condition.

Hot sticks are used by crews when working with equipment in the system. Hot sticks are cleaned regularly according to OSHA standards.

Miscellaneous tools and equipment used by crews in the field are cleaned and maintained by the crews as work.

Line truck buckets and booms undergo dielectric testing yearly. Booms on line trucks are load-tested annually. Trucks over 26,000 pounds get a pre-ride and a post-ride check daily.

MGE - Preventative Maintenance Plan for Electric Facilities

Appendixes

Appendix A - Overhead Transmission Facilities

Overhead transmission line inspection report form

Appendix B - Underground Transmission Facilities

Underground transmission line patrol report form

Appendix C - Wood Transmission Poles

Transmission wood pole inspection checklist

Appendix D - Substation Transmission and Distribution

Index of Substation Maintenance Standards

Summary of relays and tests in use

Substation logbook entry samples

Appendix E - Underground Distribution Equipment

Switch cabinet inspection report form

Underground residential distribution (URD) inspection report form

Dead front pad-mount cabinet inspection form

Appendix F - Distribution Network and Customer-Owned Vaults

AC network vault equipment report form

Customer-owned transformer/enclosure inspection report form

Appendix G - Overhead Switches

Overhead switch checklist form

Appendix H - Overhead Capacitor Banks

Distribution capacitor bank inspection procedures

Appendix I - Overhead Distribution Poles

Distribution pole inspection checklist

Appendix J - Electric Meter Shop Inspection Forms

Substation inspection checklist for biweekly inspections

ME line recloser inspection report form

S&C automatic transfer switchgear inspection form

Voltage regulator inspection report form

Substation nitrogen log

Generator inspection checklist form

Appendix K - Safety-Related Documents

Rubber goods exchange memo

Truck inspection form

Driver's vehicle condition report

Gasoline or limited duty diesel powered vehicle inspection

Appendix A

Overhead Transmission Facilities

Columbia to Wyocena section of the
Columbia to South Fond du Lac & Columbia to Rockdale 345kv Transmission Lines

Page 1 of 2

PATROL DATE: _____

Inspection Item #	COL Bay	1A	1B	1	2	3	4	5	6	7A	7B	7C	8	9	10	11	12	13	14	15
Insulators																				
Ground Wire																				
High Voltage Signs																				
Aerial Patrol Signs																				
Trimming Needed																				
Painting Needed																				

Inspection Item #	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Insulators																				
Ground Wire																				
High Voltage Signs																				
Aerial Patrol Signs																				
Trimming Needed																				
Painting Needed																				

Poles on the Columbia-South Fond du Lac and the Columbia-Rockdale 345kv lines are double circuited from the Columbia plant to #59 at Wyocena. On this patrol report, designate which circuit the Inspection Item # is on.

Columbia to Wyocena section of the
Columbia to South Fond du Lac & Columbia to Rockdale 345kv Transmission Lines

Page 2 of 2

PATROL DATE: _____

Inspection Item #	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
Insulators																				
Ground Wire																				
High Voltage Signs																				
Aerial Patrol Signs																				
Trimming Needed																				
Painting Needed																				

Inspection Item #	56	57	58	59																
Insulators																				
Ground Wire																				
High Voltage Signs																				
Aerial Patrol Signs																				
Trimming Needed																				
Painting Needed																				

Poles on the Columbia-South Fond du Lac and the Columbia-Rockdale 345kv lines are double circuited from the Columbia plant to #59 at Wyocena. On this patrol report, designate which circuit the Inspection Item # is on.

Appendix B

Underground Transmission Facilities



69/138-kV UNDERGROUND TRANSMISSION LINE PATROL REPORT

Transmission Line Patrolled

Patrolled by

Date

Time

Existing Conditions (give location and description)

NEW
CONSTRUCTION

☐ None

OLD
CONSTRUCTION
(previously reported)

☐ None

DEAD TREES,
GRASS, SHRUBS

☐ None

SUNKEN GROUND,
CRACK IN ROAD

☐ None

MANHOLE COVERS

☐ In Place

☐ Missing

☐ Ajar

☐ Other (broken, etc.)

SIGNS

Underground
High Voltage

☐ O.K.

Road or
Creek Crossing

☐ O.K.

MISCELLANEOUS
CONDITIONS

RISER STRUCTURES		Beginning	Ending
	Poles		
	Riser Pipes		
	Potheads		
	Ground Wire		
	Hardware		
	Insulators		
	Conductor		
SUB- STATIONS	Fences and Locks		
	General Appearance		

These transmission lines should be walked in areas not accessible by vehicular traffic. These reports are due at 8:00 a.m. the day following the patrol date.

Appendix C

Wood Transmission Poles

T-LINE POLE INSPECTION CHECKLIST

✓	ITEMS	
	Inspector:	Date:
	Pole No.:	
	Manufacturer:	
	Year Installed:	
	Hgt. Class:	
	Miscellaneous Codes:	
	Insects:	
	Inspection Types:	
	Species:	
	Treatment:	
	Wood Pole Descr.:	
	Aboveground Line Decay:	
	Belowground Line Decay:	
	Previous Cycle:	
	Maintenance Conditions	
	Miscellaneous Remarks:	
	MITC Fume (No. vials of insecticide):	
	Internal Treat:	
	Private Property:	
	Ground Wire Molding:	
	Danger Sign:	
Comments:		

Appendix D

Substation Transmission and Distribution

Substation Maintenance Standards

Subject

Table of Contents

Date Issued
or Revised

•	Cover Page	
00	Table of Contents	
100	General Safety	
200	Environmental Concerns	12/09/94
300	Station Batteries and Racks	12/09/94
400	Station Battery Chargers	12/09/94
500	Power Transformers	12/09/94
600	Load Tap Changers	12/09/94
700	Power Circuit Breakers	12/09/94
800	Switches	12/09/94
900	Buss Work	12/09/94
1000	Emergency Generators	12/09/94
1100	Relays	12/09/94
	Relay Test Procedure (RTP):	
1101	Balser BE-1-32 Relay	12/09/94
1102	Fitchburg Automatic Transfer Switch	12/09/94
1103	Fitchburg DC Alarms	12/09/94
1104	Fitchburg Lockout Relays	12/09/94
1105	General Electric ACR Recloser	12/09/94
1106	General Electric BDD Relay	12/09/94
1107	General Electric GCX Relay	12/09/94
1108	General Electric IAC Relay	12/09/94
1109	General Electric IBC Relay	12/09/94
1110	General Electric IBCG Relay	12/09/94
1111	General Electric IJS Relay	12/09/94
1112	General Electric JBCG 53 and 63 Relays	12/09/94
1113	General Electric NAA Relay (Style 12NAA27AD1A)	12/09/94
1114	General Electric NAA Relay (Style 12NAA27M16A Only)	12/09/94
1115	General Electric PJC Relay	12/09/94
1116	General Electric RPM Relay	12/09/94
1117	General Electric SAM Relay	12/09/94
1118	General Electric SBA Relay	12/09/94
1119	NSP-DC Power Supply Alarm	12/09/94
1120	NSP Lockout Relays	12/09/94

1121	RIS Relay	12/09/94
1122	West Middleton Lockout Relays - 138KV	12/09/94
1123	Westinghouse AR Relay	12/09/94
1124	Westinghouse BL1 Thermal Relay	12/09/94
1125	Westinghouse CA-% Differential Relay	12/09/94
1126	Westinghouse CA-16 Relay	12/09/94
1127	Westinghouse CN-33 Network Protector	12/09/94
1128	Westinghouse CO Relay	12/09/94
1129	Westinghouse H3 Relay	12/09/94
1130	Westinghouse IRD-8 Relay	12/09/94
1131	Westinghouse IRQ-9 Relay	12/09/94
1132	Westinghouse IRV-8 Relay	12/09/94
1133	Westinghouse ITE 62T Relay	12/09/94
1134	Westinghouse ITH Relay	12/09/94
1135	Westinghouse KC-2 Relay	12/09/94
1136	Westinghouse KC-4 Relay	12/09/94
1137	Westinghouse KD-4, KD-10, KD-11 and KD-41 Relays	12/09/94
1138	Westinghouse KF Relay	12/09/94
1139	Westinghouse KH-2 Relay	12/09/94
1140	Westinghouse MG-6 Relay	12/09/94
1141	Westinghouse PUF-59 Relay	12/09/94
1142	Westinghouse RC Relay	12/09/94
1143	Westinghouse SG Relay	12/09/94
1144	Westinghouse SGR-52 Relay	12/09/94
1145	Westinghouse SKB Relay	12/09/94
1146	Westinghouse SX Relay	12/09/94
1147	Westinghouse TD-4 Relay	12/09/94
1148	Westinghouse TD-5 Relay	12/09/94
1149	Westinghouse TD-52 Relay	12/09/94
1150	General Electric IJD Relay	09/21/95
1200	Reclosers	12/09/94
1300	Regulators	12/09/94
1400	Capacitors	12/09/94
1500	Grounding System	12/09/94
1600	Communications Systems	12/09/94
9900	Appendix	
9901	Test Equipment Available	12/09/94
9902	Forms and Documentation	12/09/94
9903	Substations/Gate Stations	12/09/94

◆ ◆ ◆

Relay Summary Types and Tests

ALL RELAYS

Functional testing

- Electromechanical, including
 - Beckwith backup
 - Tap-changing relays on transformer

Use self testing in the relays where available.
Check for loose connections in the control wiring.
Verify and set the line drop compensation.

Test relays associated with transfer switches and generators where applicable.

Change relay settings as required by engineering.

TEST EQUIPMENT USED

- Epoch 1
- TV2
- Relay test can
- Meters as needed for impedance, voltage and current
- Slide in test jacks
- Resistors and testers

TYPES OF RELAYS

- Overcurrent
 - Phase directional overcurrent
 - Ground directional overcurrent
 - Instantaneous overcurrent
 - Ground directional overcurrent negative sequence
 - High speed overcurrent
- Differential
 - Transformer
 - Buss
 - Percent differential
- Synch-check
- Distance
- Frequency
 - Under frequency
- Auxiliary
 - Transfer trip
- Reclosing
- Thermal
- Timing
- Power
- Voltage

TESTS FOR RELAY TYPES

- Overcurrent
 - Overcurrent pickup
 - Overcurrent timing
 - Instantaneous pickup
 - Target pickup

- Target dropout
- Directional pickup
- Directional current pickup
- Directional voltage
- Time target pickup
- Instantaneous target
- Tap pickup
- Time curve
- Contact pickup
- Instantaneous over current pickup
- Negative sequence voltage filter adjustment
- Negative sequence current filter adjustment
- Differential
 - Tap pickup
 - Slope
 - Harmonic restraint
 - Instantaneous target pickup
 - Minimum pickup
 - Percent differential
 - Time curve
 - Target pickup
 - Fault detector
 - Pickup
 - Through fault
 - Percent slope
- Synch-check
 - Closing angle
 - Timing
 - Telephone relay
- Distance
 - Full functional
 - Setting
 - Meter
 - Mho unit
 - Directional element
 - Residual overcurrent
 - Residual time-overcurrent timing
 - Phase overcurrent
 - Loss-of-potential
 - DG and DP timer tests
 - Remote end just open
 - Switch onto faults
 - Recloser
 - Synchronizing and polarizing voltage
 - Voltage checking logic
 - Synchronism checking logic
 - Input circuits
 - Serial ports
 - Time code input
 - Power supply voltage
 - Three phase reach
 - Three phase angle of max torque

Relay Summary Types and Tests

- Phase to phase reach
 - Phase to phase angle max torque
 - Target pickup
 - Mho unit spring adjustment
 - Ohmic reach test
 - Angle of max torque
 - Ohm unit spring adjustment and reach test

 - Frequency
 - Frequency trip
 - Telephone relay
 - Target pickup
 - Frequency and timing
 - Under voltage dropout

 - Auxiliary
 - Unit test
 - Opening test
 - Coil pickup

 - Reclosing
 - Timing
 - Pickup timing delay
 - Pickup
 - Reset
 - Reset timing
 - Reclose timing

 - Thermal
 - Overload
 - Preload
 - Instantaneous
 - Instantaneous target
 - Time target pickup

 - Timing
 - Telephone relay pickup
 - Timing
 - Target pickup

 - Power
 - Relay pickup
 - Relay timing
 - Target pickup

 - Voltage
 - Under voltage pickup
 - Timing under voltage
 - Target pickup
-

$\mu(0.154)$

10/2/00 1320 Top in brief no targets identified

Top 1314, Ion C¹⁸⁶ & good. Wire down at Sub 2 mo. IR
2 oper. 69503, 2 oper 69502 to repair hot spots on 6956 OCB - RL5
1320 - 1 op, T targets on B+C & Unknown AK

10/2/00 1520 top in hole no targets 1 penetration

T

ALARMS 3RD WEEK

155

359		1320	HRS	1352	1317	HRS	1351	1315	HRS	1313	HRS	1357	VEEDER	NITRO	#1	TRANS 124	#2	TRF 82	#3	TRF-68	#4	TRF 69	BY	COMMENTS
59	97	79.8	08	21	3.4	53	61	69.0	55	72.0	83	96894	1300	51117	1400	32069	1850	22333	1300	SW	ALARM ✓			
59	97	79.8	10	21	11.8	53	61	69.0	55	72.0	83	97203	1050	51391	1250	32069	1650	22333	1300	SW	SWITCHING			
59	97	79.8	10	21	12.6	53	61	69.0	55	72.0	83	97463	900	51664	1200	32069	1450	22333	1200	JD	SWITCHING			
59	97	79.8	18	21	12.6	53	61	69.0	55	72.0	83	97773	2100	51960	1150	32070	1350	22334	1100	JD	SWITCHING			
59	97	80.1	21	21	37.3	53	61	69.0	55	72.0	83	98067	2100	52198	1200	32070	1350	22334	1125	JD				
59	98	80.3	27	21	45.9	53	61	69.0	55	72.0	83	98324	1950	52443	1150	32070	1150	22334	1075	JD				
59	98	80.4	33	24	46.8	53	63	69.0	55	72.0	83	98586	1825	52673	1150	32070	1100	22334	1025	JD				
59	98	80.6	39	24	53.5	53	63	69.0	55	72.0	83	99007	1675	53025	1100	32072	950	22336	975	JD				
59	98	82.4	41	24	64.5	53	63	69.0	55	72.0	83	99375	1550	53373	1100	32073	875	22337	925	JD				
59	98	83.3	47	24	77.6	53	63	69.0	55	72.0	83	99918	1450	53800	1150	32073	850	22337	950	JD				
59	98	83.8	49	24	77.6	53	63	69.0	55	72.0	83	100231	1325	54078	1100	32076	2200	22340	900	JD				
59	99	84.1	53	24	77.6	53	63	69.0	55	72.0	83	100636	1200	54430	1075	32078	2025	22342	875	JD				
59	00	84.3	58	24	77.6	53	63	69.0	55	72.0	83	101083	1000	54838	1000	32080	1800	22344	2000	JD				
59	00	84.5	62	24	77.6	53	63	69.0	55	72.0	83	101502	800	55218	950	32086	1625	22350	1775	JD				
59	00	84.8	66	24	77.7	53	63	69.1	55	72.0	83	101803	2200	55521	1000	32086	1550	22350	1700	JD				
59	01	85.3	66	24	77.7	53	63	69.1	55	72.0	83	102056	1900	55810	900	32086	1300	22350	1500	JD				
59	01	85.5	66	24	77.7	53	63	69.1	55	72.0	83	102423	1600	56222	850	32087	1150	22351	1300	JD				
																							ALARMS	

146956, dividing; 22.

Down 13859 Test. new 1200/5 CT. i. th. 1200/5. 11/18

7-5-a1

10-25-00

Appendix E

Underground Distribution Equipment



SWITCH CABINET INSPECTION REPORT

Type	Map Location Number
------	---------------------

Primary Cable	Open	Close	Blades	Fuse	Fuse Size
AØ to					
BØ to					
CØ to					
AØ to					
BØ to					
CØ to					
AØ to					
BØ to					
CØ to					
AØ to					
BØ to					
CØ to					

	Yes	No	Comments
Has Fault Indicators			
Needs Leveling			
Needs Raising/Lowering			
Needs Painting			
Needs Protective Posts			
Ground Sleeve O.K.			
Adequate Operating Clearance			

Remarks

Inspected by	Date
--------------	------

URD PADMOUNT TRANSFORMER INSPECTION

Inspected By Date Inspected

Map/pole / Size KVA Make Serial #

Primary Taps 3 Phase ☐

Secondary Impedance 1 Phase ☐ Phase

Next Structure A Phase

	Map/pole	Open Ckt
1	<input type="text"/> / <input type="text"/>	<input type="text"/>
2	<input type="text"/> / <input type="text"/>	<input type="text"/>

Next Structure B Phase

	Map/pole	Open Ckt
1	<input type="text"/> / <input type="text"/>	<input type="text"/>
2	<input type="text"/> / <input type="text"/>	<input type="text"/>

Next Structure C Phase

	Map/pole	Open Ckt
1	<input type="text"/> / <input type="text"/>	<input type="text"/>
2	<input type="text"/> / <input type="text"/>	<input type="text"/>

Paint OK	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Posts OK	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Cable Marked	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Signs OK	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Clearance OK	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Setting OK	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
No Leaks	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Cables Ok	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Dbi Locked	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Other OK	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Cabinet OK	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>

Remarks

DEAD FRONT PADMOUNT CABINET INSPECTION

TYPE	<input type="text"/>	NUM POS	<input type="text"/>	MAP	<input type="text"/>	POLE	<input type="text"/>	DATE INSP	<input type="text"/>
3 PHASE	<input type="checkbox"/>	1 PHASE	<input type="checkbox"/>	PHASE	<input type="text"/>			INSP BY	<input type="text"/>

PHASE CONNECTIONS

A TO 1	<input type="text"/>	B TO 1	<input type="text"/>	C TO 1	<input type="text"/>	A TO 1 OC	<input type="checkbox"/>	B TO 1 OC	<input type="checkbox"/>	C TO 1 OC	<input type="checkbox"/>
A TO 2	<input type="text"/>	B TO 2	<input type="text"/>	C TO 2	<input type="text"/>	A TO 2 OC	<input type="checkbox"/>	B TO 2 OC	<input type="checkbox"/>	C TO 2 OC	<input type="checkbox"/>
A TO 3	<input type="text"/>	B TO 3	<input type="text"/>	C TO 3	<input type="text"/>	A TO 3 OC	<input type="checkbox"/>	B TO 3 OC	<input type="checkbox"/>	C TO 3 OC	<input type="checkbox"/>
A TO 4	<input type="text"/>	B TO 4	<input type="text"/>	C TO 4	<input type="text"/>	A TO 4 OC	<input type="checkbox"/>	B TO 4 OC	<input type="checkbox"/>	C TO 4 OC	<input type="checkbox"/>
A TO 5	<input type="text"/>	B TO 5	<input type="text"/>	C TO 5	<input type="text"/>	A TO 5 OC	<input type="checkbox"/>	B TO 5 OC	<input type="checkbox"/>	C TO 5 OC	<input type="checkbox"/>
						A FUSE 1	<input type="checkbox"/>	B FUSE 1	<input type="checkbox"/>	C FUSE 1	<input type="checkbox"/>
						A FUSE 2	<input type="checkbox"/>	B FUSE 2	<input type="checkbox"/>	C FUSE 2	<input type="checkbox"/>
						A FUSE 3	<input type="checkbox"/>	B FUSE 3	<input type="checkbox"/>	C FUSE 3	<input type="checkbox"/>
						A FUSE 4	<input type="checkbox"/>	B FUSE 4	<input type="checkbox"/>	C FUSE 4	<input type="checkbox"/>
						A FUSE 5	<input type="checkbox"/>	B FUSE 5	<input type="checkbox"/>	C FUSE 5	<input type="checkbox"/>

	Y/N	COMMENT	DATE DONE
ARRESTORS	<input type="checkbox"/>	<input type="text"/>	
LEVEL	<input type="checkbox"/>	<input type="text"/>	
RAISE/LOW	<input type="checkbox"/>	<input type="text"/>	
PAINT	<input type="checkbox"/>	<input type="text"/>	
PR POST	<input type="checkbox"/>	<input type="text"/>	
WARNING SIGN	<input type="checkbox"/>	<input type="text"/>	
CABLES MARKED	<input type="checkbox"/>	<input type="text"/>	
FITS PAD	<input type="checkbox"/>	<input type="text"/>	
LUBE HINGE	<input type="checkbox"/>	<input type="text"/>	
CLEARANCE	<input type="checkbox"/>	<input type="text"/>	
OTHER	<input type="checkbox"/>	<input type="text"/>	
DBL LOCK	<input type="checkbox"/>	<input type="text"/>	
SET OK	<input type="checkbox"/>	<input type="text"/>	
NO LEAK	<input type="checkbox"/>	<input type="text"/>	
CAB CONDITION	<input type="checkbox"/>	<input type="text"/>	

REMARKS

Appendix F

Distribution Network and Customer-Owned Vaults

Feeder No.

[illegible]

Customer Owned Transformer/Enclosure Inspections

Address _____

Map Number _____

Customer _____

Inspection Date _____ By _____

Vault Y N

Enclosure Y N

Primary Service Condition _____

Transformer Condition _____

Secondary Service Condition _____

Vault/Enclosure Condition _____

Doors/Locks/Fence Condition _____

Vault Lighting _____

Danger High Voltage Signs _____

Do Not Enter sign _____

Miscellaneous Comments _____

Appendix G

Overhead Switches

OVERHEAD SWITCH CHECKLIST

✓	ITEMS		
	Inspector Name:	Date:	
	Switch No.:		
	Address:		
	Pole No.:		
	Manufacturer:		
	Model No.:		
	Circuit:		
	Insulator post	<input type="checkbox"/> OK	<input type="checkbox"/> Bad Phase: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C Problem: Fixed: <input type="checkbox"/> Yes <input type="checkbox"/> No
	Insulator suspension	<input type="checkbox"/> OK	<input type="checkbox"/> Bad Phase: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C Problem: Fixed: <input type="checkbox"/> Yes <input type="checkbox"/> No
	Contacts	<input type="checkbox"/> OK	<input type="checkbox"/> Bad Phase: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C Problem: Fixed: <input type="checkbox"/> Yes <input type="checkbox"/> No
	Jumpers	<input type="checkbox"/> OK	<input type="checkbox"/> Bad Phase: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C Problem: Fixed: <input type="checkbox"/> Yes <input type="checkbox"/> No
	Handles and pipes	<input type="checkbox"/> OK	<input type="checkbox"/> Bad Phase: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C Problem: Fixed: <input type="checkbox"/> Yes <input type="checkbox"/> No
Comments:			

Appendix H
Overhead Capacitor Banks

Distribution Capacitor Bank Inspection Procedures

Completed annually and during the year as necessary

Fixed, Half-Switched, or Switched Capacitor Banks

- Check for blown fuses or arresters.
- Check for ruptured units.
- Check for leaking units.
- Check for damage by wildlife (chewed equipment/wires, bird/squirrel nests)
- Check control box (if applicable) for external damage.
- Check whether fuses are removed, for seasonal banks from September to May when loads are lower.
- Check records as to location, voltage, circuit, phases, trip/close status, seasonal, size, number, type (fixed, half-switched, switched) and current-sensing phase (if applicable).
- Record and describe any visible damaged equipment or extraordinary configurations.

Half-Switched Capacitors / Switched Capacitors (Current-Controlled or Voltage-Controlled)

- Check records as to control mode (manual, current, voltage).
- Determine whether the bank is closed or tripped via visual inspection of the oil switches.
- Check to ensure that the sensor for any current-controlled bank is downstream of the substation.
- Open control box and inspect internal conditions for damage or physical degradation.
- Record the value of the operations counter.
- Compare existing control settings (voltage or current) to previous records.
- Ensure that a spare fuse is available in the control box.
- Verify switch and control operation
- Record problems (blown control fuses, switch misoperations, on/off times less than 60 seconds, counter miscounts, swings in current, dramatic or null voltage changes).

Report problems to Electric Operations.

Appendix I

Overhead Distribution Poles

POLE CHECKLIST

DRAFT

ITEMS				
✓	Inspector:			Date:
	Pole No.:			
	Pole condition above ground	<input type="checkbox"/> OK	<input type="checkbox"/> Poor	<input type="checkbox"/> Further Inspection Needed
	Pole condition below ground	<input type="checkbox"/> OK	<input type="checkbox"/> Poor	<input type="checkbox"/> Rotten
	Crossarms	<input type="checkbox"/> OK	<input type="checkbox"/> Poor	<input type="checkbox"/> None
	Braces	<input type="checkbox"/> OK	<input type="checkbox"/> Broken/Detached	<input type="checkbox"/> None
	Insulators	<input type="checkbox"/> OK	<input type="checkbox"/> Broken	<input type="checkbox"/> None
	Lightning arrestors	<input type="checkbox"/> OK	<input type="checkbox"/> Blown	<input type="checkbox"/> None
	Ground wire molding	<input type="checkbox"/> OK	<input type="checkbox"/> Replaced	<input type="checkbox"/> None
	Guy wire shields	<input type="checkbox"/> OK	<input type="checkbox"/> Replaced	<input type="checkbox"/> None
	High-voltage signs	<input type="checkbox"/> OK	<input type="checkbox"/> Replaced	<input type="checkbox"/> None
	Pole tags	<input type="checkbox"/> OK	<input type="checkbox"/> Missing	
	Cable TV attached?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	Phone wires attached?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Comments:				

Appendix J

Electric Meter Shop Inspection Forms

Substation Inspection Checklist for the Biweekly Inspections (Inspections done by the Electric Meter Shop)

Reporting Method for the Electric Meter Shop

The following checklist is to be used for determining abnormal items (exceptions). These are reported one of two ways:

All exceptions are logged into a spreadsheet (called "exception.xls" on the engineering network) to be evaluated by Substation Maintenance for follow-up.

All critical items that need Immediate Response are reported to the Substation Maintenance Supervisor.

The Bi-weekly Inspection Checklist

Station Batteries and Associated Equipment

- ☐ Overall visual inspection of batteries and associated equipment checking for deterioration.
- ☐ Electrolyte fluid level and leaks. (Including sediment and corrosion)
- ☐ Check battery charger currents and grounds.

Power Transformers

- ☐ Nitrogen gas pressure checks.
- ☐ Gas and oil leaks. (Gas blowing / hissing)
- ☐ Oil level and temperature check.
- ☐ Winding temperature. (TRO)
- ☐ Cooling fan status.
- ☐ Oil circulating pump status. (on automatic)
- ☐ Porcelain condition.
- ☐ Desiccant filter condition. (Purple is good, Pink is bad)
- ☐ Compartment heaters.

Load Tap Changers

- ☐ Check for oil level, oil leaks and gas leaks. (Gas blowing / hissing)
- ☐ Veeder count (number of operations).
- ☐ Tap position and range, resetting drag hands as applicable.
- ☐ Control setting and mode. (on automatic)
- ☐ Compartment heaters.

Power Circuit Breakers

- ☐ Oil leaks.
- ☐ Status of breaker, control and recloser. (supervisory or manual)
- ☐ Verify trip air pressure and check for leaks. (spring or air charged)
- ☐ Veeder counts. (operations)
- ☐ Check over compressor, drain water and check pressures.
- ☐ Accumulator pressure and hydraulic pressure.
- ☐ Confirm proper pressure in all SF6 equipment.
- ☐ Porcelain condition

Substation Inspection Checklist for the Biweekly Inspections (Inspections done by the Electric Meter Shop)

Disconnect Switches

- ☐ Visual inspection of switch components checking for any damage, positive and proper seating (flush), and no obstructions.
- ☐ Check for broken insulators.

Bus Work

- ☐ Visual inspection checking for any damage.
- ☐ Check for broken insulators.

Emergency Generators

- ☐ Visual inspection of generators and batteries checking for leaks, corrosion, and structural damage.
- ☐ Check fluid levels.

Relays - General

The following are general guidelines that apply to all relays.

- ☐ Visual inspection making sure covers are seated.
- ☐ Check, record and reset any targets.

Reclosers

- ☐ Visual inspection to check recloser, bushings and remove accumulated debris.
- ☐ Check recloser status and mode.
- ☐ Check for fluid leaks and oil level. (Check DC Battery)
- ☐ Check Veeder counts. (Record in log book)

Regulators

- ☐ Visual inspection to check for damage or debris.
- ☐ Check regulator status.
- ☐ Check for fluid leaks.

Capacitors

- ☐ Visual inspection to check fusing, damage and for debris.
- ☐ Check for fluid leaks. (read Veeder count and record in log book)

Grounding System

- ☐ Visual inspection of connections and conditions. (if they can be seen)

Miscellaneous Items

- ☐ Cathodic Protection – check for oil leaks and fusing
- ☐ Replace burnt out lamps
- ☐ Fire extinguisher check
- ☐ Security check – Fencing, gates and locks
- ☐ Check auto transfer switch for station service
- ☐ Check auto transfer S&C gear for ready light, general condition and Veeder counts (record in log at the site)
- ☐ BGS (Backup Generation Service) units inspect using the “Generator Inspection Checklist”.



M.E. LINE RECLOSER INSPECTION

Date

Location	Phase Resistor	% of Ø Resistor			Veeder Count	Ops.	Batt. Volts	Targets and Comments	By
		A%	B%	C%					
Bronner at Airport Road	*	43 51	42 50	41 49					
Lodi Springfield at Woodland	200A								
Hwy K East of Hwy 12 Ashton Corners	*	43 51	42 50	41 49					
Hwy. M at Mendota Co. Park East of Hwy. Q	*	41 49	42 50	43 51					
Pheasant Branch 1321	560A								
Pheasant Branch 1322	560A								
Seminole Hwy. at R.R.	400A								
Seminole Hwy. at Lacy	400A								
McKee Road	400A								
Fish Hatchery Rd. South of Lacy	*	41 49	42 50	43 51					
Larsen Road	400A								
Femrite Drive	280A								
Gateway Sub	400A								
Sycamore Ave. at N. Thompson	400A								
Anderson St. at MATC	400A								
Pierstorff St.	400A								
Hwy. 51 at Hanson	200A								
Mendota Sub.	400A								
Wheeler Road	400A								
Hwy. M & Willow Road	400A								

*The microprocessor controls give readings in amps. Items 41-43 are instantaneous phase currents. Items 49-51 are maximum 15 minute average phase currents and are reset individually with the CLEAR key. Use the CLEAR key to reset any targets.



S & C AUTOMATIC TRANSFER SWITCHGEAR INSPECTION

Date _____

Address/Customer	Map-Pole Number	Type	Owner	READY Light On*	Switch Numbers	Veeder Count	Operations since last inspection	Comments	By
1313 John Q Hammons St. Marriott, Madison West	16Y9-C1	Pad-mount	MGE		1604				
					259 N.O.				
1313 John Q Hammons St. Marriott, Madison West	16Y9-C2	Pad-mount	MGE		507				
					1181 N.O.				
8200 Hwy. 14 (@ Deming Way) City of Middleton Lift Station	16Y1-D1	Pad-mount	MGE		1321				
					1333 N.O.				
5910 Mineral Point Rd. CUNA (Computer Support Facility CSF)	19H8-G25	Vault	MGE		1169				
					1028 N.O.				
					1273				
707 S. Mills St. St. Mary's Hospital	216-B20	Vault	Customer		1800				
					1569 N.O.				
					1622				
202 S. Park St. Meriter Park Hospital (Chandler St. end)	116-	Out-door	Customer		1593				
					1737 N.O.				
					1628				
202 S. Park St. Meriter Park Hospital (Basement Atrium Addition)	122-	Vault	Customer		1835				
					1783 N.O.				
115 W. Doty St. Dane County (PSB)	104-G4	Vault	MGE		1585				
					1666 N.O.				
1 John Nolen Drive Monona Terrace Conv.	4 - M2	Vault	MGE		1681				
					1906 N.O.				
302 N. Walbridge Ave. American Family Insurance	27Y2-	Out-door	Customer		1310				
					Tie N.O.				
					1312				
3550 Anderson St. MATC - Truax	26JT5-	Vault	Customer		To 582				
					Tie N.O.				
					To 975				
2401 International Lane Great Lakes Higher Ed.	25JT3 -G24	Pad-mount	MGE		391				
					1725 N.O.				
4000 International Lane Airport Terminal	25K13 -A27	Pad-mount	MGE		Right SW				
					Left SW N.O.				
3400 E. Washington Avenue Gardner Baking Company	26J5 -J25	Pad-mount	MGE		Right SW N.O.				
					Left SW				
Spring St. @ N. Park St. Storm water pump site	121- A33	Pad-mount	MGE		Right SW N.O.				
					Left SW				

* If READY light is not on, see back for list of possible reasons.

CONDITIONS REQUIRED FOR THE READY LIGHT

Manual/automatic selector switch in AUTOMATIC.

Both source voltages are good.

Alternate source switch or bus tie switch is open. The normal source(s) switch is closed.

Switch operators are charged and coupled to switches.

Switch compartment doors are closed and latched.

Overcurrent LOCKOUT is reset (if the switchgear has this option).

Key interlocks are unlocked (if the switchgear has interlocks).

Voltage unbalance detection feature is on (if the switchgear has this option).



VOLTAGE REGULATOR INSPECTION REPORT

Date _____

Time _____

Voltage Regulator Installation:

- ☐ Wheeler Rd. west of Packers Ave.
☐ Cross Plains Substation
☐ Milwaukee St. east of I90
☐ Other _____

	A-Phase	B-Phase	C-Phase
Tap Changer position	_____	_____	_____
Tap Changer range (DRAG HANDS RESET)	_____	_____	_____
OPERATION COUNTER Reading	_____	_____	_____
# of operations since last reading on _/_/_	_____	_____	_____
Terminal VOLTAGE TEST	V	V	V
NORMAL Voltage Source & AUTO Operation	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
SYSTEM STATUS			
WATCHDOG light flashing (Normally yes)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
RPF (Reverse Power Flow) light on*	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
ALERT light on	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
BAND INDICATOR	High/In/Low	High/In/Low	High/In/Low
DATA/PAK Digital Display			
ALERT	_____	_____	_____
ALERT (After pressing reset button on side of panel)	_____	_____	_____
Current Load Information			
AMPS*	_____	_____	_____
PF (Power Factor)	<input type="checkbox"/> lead <input type="checkbox"/> lag	<input type="checkbox"/> lead <input type="checkbox"/> lag	<input type="checkbox"/> lead <input type="checkbox"/> lag
VOLTS	_____	_____	_____
COMP VOLTS	_____	_____	_____
DRAG HANDS Readings of Load Extremes	<input type="checkbox"/> lead	<input type="checkbox"/> lead	<input type="checkbox"/> lead
LAG PF (Most lagging power factor)	<input type="checkbox"/> lag	<input type="checkbox"/> lag	<input type="checkbox"/> lag
LEAD PF (Most leading power factor)	<input type="checkbox"/> lead <input type="checkbox"/> lag	<input type="checkbox"/> lead <input type="checkbox"/> lag	<input type="checkbox"/> lead <input type="checkbox"/> lag
MAX AMP (Maximum load current)*	_____	_____	_____
HIGH VOLT (Highest output voltage)	_____	_____	_____
LOW VOLT (Lowest output voltage)	_____	_____	_____

(Reset button is located on top of the DATA/PAK. Each DRAG HANDS reading must be reset individually.)

General Condition: _____

Inspection by: _____

*During reverse power flow, the load current readings can be in error by as much as 10% because the current transformer is then located on the source side.



GENERATOR INSPECTION CHECKLIST

Date _____

Inspected by (Initials) _____

D.G. Number _____

Container

Exterior

- ☐ Call Power Supply 252-7252 and notify them that you are inspecting DG _____.
- ☐ Rodents/Birds
- ☐ Vandalism
- ☐ Drains (4" PVC)
- ☐ Pad Seal
- ☐ Grounding ☐ Stains

Interior Can start at any time

- ☐ Rodents/Birds
- ☐ Room Temperature _____ °F
- ☐ Abnormal Sounds
- ☐ Abnormal Smells
- ☐ Abnormal Vibration
- ☐ Stains

Engine

- ☐ Put engine switch to "OFF". Press the Silence/Lamp Test button on the annunciator panel to silence the "Not in Auto" alarm.
- ☐ Spill Kits Available.
- ☐ Lighting
- ☐ Oil Level

H

L
- ☐ Coolant Leaks
- ☐ Oil Leaks
- ☐ Fuel Leaks
- ☐ Battery Charger ON
- ☐ L/R Air Cleaner Indicators
 - ☐ Clear ☐ Red
- ☐ Battery Cables _____
- ☐ Coolant Temperature L _____ R _____
(To determine, press "self test" button, then "engine" button, then "coolant" button)
- ☐ _____ Hour Meter Reading (press "self test", then "engine" button, then "coolant >>" button, then "hours" button)
- ☐ _____ kWh (at the Master Control, go to MAIN MENU, then to GENSET METERING. The kWh reading will be on lower left side of screen.)

Battery Voltage _____

Battery Amps _____

☐ Generator Breaker Charged

☐ Utility Breaker Charged

Switchgear

- ☐ Screen Saver Active

Fuel

- ☐ Level Check one:
 - ☐ Empty ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ Full
- ☐ Check for Leaks
 - ☐ Fuel ☐ Water
- ☐ Rodents/Birds

Put Engine Key in Auto Position ☐ Lock all padlocks
Call Power Supply and notify them that you are done.

Notes _____

Appendix K
Safety-Related Documents

COPY

Materials Management

MEMORANDUM

DATE: November 15, 2000

TO: Pat Baldwin
Doug Bufton
Larry Capps
Dale Freiman
Rick Jilot

Al Mickelson(Forms)
Don Pierstorff (Forms)
Dick Schwarz
Dennis Steinhorst

FROM: John Capacio *JC*
Jerry Peplinski *JP*

SUBJECT: Rubber Goods Exchange

Please inform all concerned personnel that the exchange of rubber goods is scheduled for the week of *November 20, 2000*. ETD staff will exchange their rubber goods at the Stores service counter in the Central Service Center. Electric Production, Meter and Connection, and Electric Meter Shop personnel will exchange their rubber goods at the Service building.

ETD Personnel

Attached are the Rubber Goods Exchange Forms for ETD staff. The truck assignments came from the ETD Crew List of the Week of November 20, 2000. The glove and sleeve sizes for ETD personnel and trucks came from data recorded from previous rubber goods exchanges. Rubber mitts and other items such as leather shields for 20kV gloves and 1kV gloves, sleeve buttons, glove powder, etc. are available from the Storeroom. **Please note: There are no requisitions for ETD supervisory personnel for this exchange. If you need to exchange your gloves, please do so at the CSC Storeroom.**

For ETD personnel who are on vacation this week and report to the CSC, please hold the form until they return and have them exchange their rubber goods at the Stores service counter. **If they report to Fitchburg, Cross Plains, or Job Site**, have them complete the form and send it to Stores. Stores will arrange to deliver their new rubber goods and pick up their old rubber goods.

For all other ETD personnel, have the crew leader confirm the size information for gloves and sleeves. Turn the form in to the Storeroom. Stores personnel will fill each request during the week. Stores personnel will place the requested items in a tote and place the tote next to the vehicle. ETD crews will remove the new rubber goods from the tote and place their old rubber goods in the tote. Stores personnel will bring the tote back to the Storeroom.

Note: Rubber blankets will not be exchanged this time. Line hose will be exchanged instead. ETD staff should see their supervisor for details.

November 15, 2000

Page 2

Meter and Connection, Electric Production, Electric Meter Shop and Gas Distribution.

Electric Production will pick up their standard order from the Electric Meter Shop. Please exchange the new rubber goods for the old and return the old gloves to the Electric Meter Shop.

All other personnel with the exception of Meter and Connection personnel reporting to Fitchburg will exchange their rubber goods at the Electric Meter Shop. The rubber goods exchange for Meter and Connection personnel reporting to Fitchburg will be handled by the Superintendent - Electric Measurement and Service.

If you have any questions regarding the rubber goods exchange, please call John Capacio at extension 7038 or Jerry Peplinski at extension 7378.

cc:	Tom Branson	Edward Maass
	Tom Brice	Jim Miller
	Dave Crary	Phil Nelson
	Dan Feeney	Vern Wardell
	Craig Fenrick	Ken Wilke



DRIVER'S VEHICLE CONDITION REPORT

Truck/Tractor No.	Trailer No.	Date In Service	Time In Service	Mileage In Service	Driver Signature In Service
-------------------	-------------	-----------------	-----------------	--------------------	-----------------------------

Preventive Maintenance Inspection Due? ☐ Yes ☐ No . . . Neglecting a small defect today, may mean a major repair job tomorrow.

Driver's Checklist:

Check box if satisfactory

Engine

- ☐ Check for Oil, Water and Fuel Leaks
- ☐ Knocks
- ☐ Misses
- ☐ Hard Starting
- ☐ Overheating
- ☐ Other _____

Clutch

- ☐ Check for Slipping or Grabbing
- ☐ Other _____

Transmission

- ☐ Noisy
- ☐ Hard Shifting
- ☐ Leaks
- ☐ Other _____

Steering

- ☐ Looseness
- ☐ Shimmy
- ☐ Steers Hard
- ☐ Other _____

Springs/Suspension

- ☐ Broken
- ☐ Other _____

Brakes

- ☐ Check Trl. Connections
- ☐ Parking Brakes
- ☐ Service Brakes
- ☐ Check for Air or Hydraulic Leaks
- ☐ Other _____

Rear Axle

- ☐ Noisy
- ☐ Grease Leaks
- ☐ Other _____

Instrument Panel

- ☐ Oil Pressure Gauge
- ☐ Ammeter
- ☐ Horn
- ☐ Windshield Wipers
- ☐ Speedometer
- ☐ Other _____

Electrical

- ☐ Check Trailer Light Cord
- ☐ Lights: Head, Tail, Stop, Turn, Clearance
- ☐ Reflectors
- ☐ Other _____

Tires

- ☐ Repair Tire
- ☐ Check Spare
- ☐ Check Wheel and Lug Bolts
- ☐ Other _____

Miscellaneous

- ☐ Drive Line
- ☐ 5th Wheel, Safety Chains and Pintle Hook
- ☐ Door Glass, Windshields and Mirrors
- ☐ Other _____

Emergency Equipment

- ☐ Fire Extinguishers
- ☐ Spare Fuses
- ☐ Tire Chains
- ☐ Three Reflective Triangles

Boom and Outriggers (if applicable)

- ☐ Proper operation of controls
- ☐ Wear and contamination of operating controls
- ☐ Malfunction of safety devices
- ☐ Excessive leakage or deterioration of hydraulic and pneumatic systems
- ☐ Insulation checked for damage or contamination
- ☐ Condition of electrical apparatus

Repair Orders Must Be Clearly Stated Here:

Maintenance Action:

☐ Corrective Action Taken On All Items

☐ Corrective Action Taken Except Items Listed Below

Explain Below

Signature _____

Date _____

Signature _____

Date _____

Parts Used _____

Date Out Service

Time Out Service

Mileage Out Service

Driver Acknowledgment Out Service



Inspection Code ☒ OK ☐ Follow-Up Needed ☐ Adjustment Made

The above tire prints are to be used to record existing tread depths and air pressures.

88-1776

GASOLINE OR LIMITED DUTY DIESEL POWERED VEHICLE INSPECTION

Inspection Code

✓ OK

○ Follow-Up Needed

✗ Adjustment Made

Lubrication		
Lubricate Chassis And Accessories		
Lubricate Door Hinges And Latches		
Check These Lubricant Levels		
1. Manual Steering box		
(A & B Only) 2. Power Steering Fluid		
3. Brake Master Cylinder		
4. Clutch Master Cylinder		
(A Only) 5. Automatic Trans. Fluid		
6. Manual Trans. Lube		
7. Two Speed Motor		
8. Differential Lube		
9. Check Trans. And Differential Breathers		
Change Engine Oil		
Change Engine Oil Filter		
(C Only) Change Power Steering Fluid & Filter		
(B & C Only) Change Auto. Trans. Fluid & Filter		
Brake Lining & Wheel Bearings		
Front Wheels:		
1. Inspect Disc Brakes Each PM. Record The % Of Lining Left _____		
(B & C Only) 2. Inspect Drum Brakes, Record The % Of Lining Left _____		
3. Inspect, Repack Grease Lubed Brgs.		
(C Only) 4. Inspect, Relube Oil Lubed Brgs.		
Rear Wheels		
Check For Loose Or Noisy Bearings		
(B & C Only) Record % Of Lining Left _____		
(B & C Only) Adjust Brakes, Front & Rear		
Battery Inspection		
Check & Record Color Of State Of Charge Indicators Or Open Circuit Voltage		
#1 _____ #2 _____		
Check For Corrosion		
Check Terminals & Cables		
Check Hold-Downs & Box Mounting		
(Each C) Load Test, Record Readings		
#1 Amps _____ #2 Amps _____		
Volts _____ Volts _____		
Cranking System		
Make Visual Inspection		
Make Starter Cranking Test		
Replace Starter Each 96,000 Miles/4 Years		
Charging System		
Make Visual Inspection		
(B & C Only) Check/Record Output Volts _____		
Replace Alt. Each 96,000 Miles/4 Years		
Air Cleaner Service		
Remove, Clean & Inspect Element		
Clean Inside Of Air Cleaner Housing		
Check Housing And Mounting Gasket		

Gas Engine Tune-Up And Service (C Inspection Only)		
1. Remove, Disassemble, Clean, Inspect, Reassemble & Reinstall Dist.		
2. Replace Coolant Hoses (Except Silicone)		
(B & C Inspection Only)		
1. Wash Dist. Cap & Rotor		
2. Inspect Secondary Wiring		
3. Replace Spark Plugs		
4. Reassemble Ignition System		
5. Check Exhaust Control Valve		
6. Check EGR Valve		
7. Replace PCV Valve		
8. Replace PCV Filter		
9. Clean PCV Hoses, Test System		
10. Check Air Injection System		
11. Change Fuel Filter(s)		
12. Check Choke For Proper Operation		
13. Tighten Carb. Screws & Hold Down Bolts		
14. Check Carb. Redundant Linkage		
15. Set Initial Timing		
16. Check Timing Advance		
17. Adjust Idle Speed & Mixture		
Each Inspection		
Check Governor Lines and Seals		
Record Governed Speed _____		
Listen For Unusual Noises/Missing		
Diesel Engine Tune-Up and Service		
(B & C Only) Replace Fuel Filter		
GM 6.2L: Inspect Exh. Press Reg. Each 12,000 Miles		
Service Crankcase Vent Each 12,000 Miles		
Replace Bearings Each 96,000 Miles		
Navistar 6.9L: Replace Bearings Each 96,000 Miles		
(C Only) Check And Record Toe-In _____		
Check License Plate & Brackets, Permits And State Safety Inspection Sticker		
Check Lift Gate Condition & Operation		
Check Overhead & Swing Doors		
Check Loading Ramp		
(One Ways) Record Inspection		
(Except O/W) Attach PM Reminder Sticker		
(C Only) Repaint Wheels As Required		
Refrigeration Unit		
1. Check PM Status		
2. Check For Physical Damage, Loose Mounts, Etc.		
3. Check/Service Engine Oil Level		
4. Check/Service Engine Coolant Level		
5. Check For Loose Belts, Components, Etc.		
6. Check Battery, Clean & Service As Required		
7. Run Unit, Check For Proper Operation		
Road Test, Check For Proper Operation		